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This Week in The IRON AGE

Vol. 156, No. 16 October 18, 1945

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How long...

How long since your last hunting trip? How many years since you have taken a fall vacation? Now, perhaps, with travel restrictions eased and the pressure of war production lifted, you can get away for a few days. Pack up and head for the fields or lakes.

You men who buy steel have been under the most pressure. You surely have earned a brief bit of relaxation. So go ahead, enjoy yourself — the boys will carry on till you return. And when it comes to steel — please know that we will do everything we can to give prompt service while you are away.

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The IRON AGE

ESTABLISHED 1855

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October 18, 1945

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Toward More Jobs and More Freedom

EVERYONE will agree that the atom must be taken out of the field of both national and world politics. Otherwise it may blow all of us to pieces. And then good-bye to postwar jobs and freedom and the world itself.

President Truman is going about the handling of the atom in the right way. He has called into consultation the men who know most about it, without thought of their political affiliations. What Dr. Vannevar Bush, Dr. Karl Compton and the other experts tell him should be done to control and direct this tremendous potential into constructive channels will meet with the overwhelming approval of our people. Americans respect the knowledge and advice of men of such caliber and reputation.

There is another gigantic force that should also be taken out of politics. Most of us know as little about its handling as we do about atomic energy. And that lack of knowledge has cost and is costing us millions of dollars daily and is second only to the atomic bomb as a threat to our postwar welfare.

The force about which we know so little is economics. All of us at times run counter to it and when we do, trouble starts. Economic law has no uniformed policemen to enforce it, but when government, capital or labor violate it, as they so often do, everyone, guilty or innocent, is inevitably punished.

Economic law is stronger than man-made law. Legislation counter to it is futile and worse than futile because it is damaging. Economic law is impartial, recognizing neither political parties nor classes. It is as immutable as the multiplication table. But that does not prevent those who ignore the multiplication table from being short-changed.

We can't have more jobs and freedom in this country or any other by going counter to economic law. But in days like these of change and stress and anxiety about the future, economic law is all too often discarded for panaceas that violate it. Panaceas with respect to taxation, to wages, to prices, to competition, to the regulation of big enterprises and the encouragement of small ones and so on ad infinitum.

It is particularly important for our future that we arrive at the right answers to these questions and the answers must run with sound economic law. It is particularly important that these problems be taken out of the political arena where they have been and can be twisted and distorted and thus made to serve selfish minority interests. And it is doubly important that the "man in the street" be advised as to them by capable authorities whose standing and reputation assure not only a knowledge of economic law but also the objective of making it work for the good of all of us. As Paul Hoffman puts it: "What's best for all of us is best for business too." And that goes also for labor, for capital and for government.

That is why I like the recommendations just made by the Research Committee of the CED. In effect it is to take economics out of politics and put economics into future legislation. It suggests the formation of two committees on full employment. One, to be set up by the President and to consist of the ablest men available, would make recommendation periodically on the matter of policy. The second, a joint Congressional committee would receive reports from the President with respect to such matters and work toward a coordinated Congressional, or national policy with respect to them.

It seems to me that this would be a big step toward more jobs and more freedom and better going for all of us.

Production of flashlights climbed 24% when the new analysis steel was used.

First Operation—Blank and draw to 2¼" diameter by 1¾".

Second Operation—Draw to 1⅞" diameter by 2¾" deep.

Third Operation—Draw to 1½" diameter by 3" deep.

Final Operations—Roll bead and threads, and weld pin clip.

Breakage Reduced from 20% TO LESS THAN 1% by INLAND STEEL

When the battery tube for this life-saving flashlight was put into production, breakage was as high as 30 percent and the average was 20 percent. This deep draw, 1½ inches in diameter by 3 inches deep, was then being made from 0.014-inch, special coated manufacturing terne plate, produced from deep drawing rimmed steel. The high breakage was a particularly serious matter, not only because of high cost, but because of an urgent production schedule.

This breakage problem was not solved until an Inland engineer and the production experts of the manufacturer, The J. L. Clark Mfg. Co., Rockford, Ill., met to study all requirements. At this meeting, they determined the type of sheet steel to be used. From receipt of the first shipment of the new steel, breakage dropped to less than 1 percent and has remained there ever since.

Inland engineers have helped many manufacturers with similar production and steel selection problems. They will be glad to work with you.

Inland Steel Company, 38 S. Dearborn Street, Chicago 3, Ill. Sales Offices: Cincinnati, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul. Principal Products: Bars, Structural, Plates, Sheets, Strip, Tin Plate, Floor Plate, Piling, Reinforcing Bars, Rails, Track Accessories.

INLAND SHEETS

NEWS FRONT

► A cutting tool developed by Pratt & Whitney in the 1920's, but unacceptable in the U.S. because it defied accepted principles of tool design, has been and is being used extensively in the John Cockerill plant, Liege, Belgium.

A 6-in. wide bit with a high-speed steel edge, is moved straight into a diesel engine crankshaft to a depth of an inch or so, ripping off a 6-in. wide chip 0.10 in. thick. The tool is mounted on a spring which will "give" as much as 1/8 in.

Final cut gives practically a microfinish due to the spring action. The high-speed cutting edge is an 18-4-1 bead laid down with a gas torch on a plain steel bit, annealed, ground and heat treated to shape.

► About 400 American business men, in England to place orders, are temporarily stalled there through inability to secure air priority back to the U.S.

► To keep in the heady scientific swim, particularly as regards atomic fission, Britain has just announced in a White Paper intention of creating an experimental officer class and elevation of scientists to a higher status.

Top-flight scientists will be paid $10,000 a year, double that paid in 1940. For the military, salaries will range from $600 a year on recruitment at the age of 18 to $3200.

It looks as if physicists are going to be forced into the unfamiliar role of fair-haired boys all over the world. But in England the above salaries indicate champagne and ermine sinecure.

► Cigarettes are the only reliable exchange medium in Germany, particularly for the purchase of food on the black market. Recently a Mercedes-Benz car, in excellent condition, was sold for 1500 cigarettes.

► Germans have developed a machine to recondition old brick for new construction. A sintered-carbide shaver removes cement as the bricks are automatically fed through the unit.

► Molding paints and powders prepared from non-siliceous materials are entirely practicable and efficient.

Preparation of the paint needs no modification when non-siliceous materials are used in place of silica flour with the same suspensory agents. However, small modifications of the density of the paint may be desirable to suit individual foundry practices.

► Impregnating carbon steels with chromium or silicon increases corrosion resistance to that of stainless steels. At high temperatures and in corrosive gases, however, the infusion treated steels have a limited corrosion resistance which can be overcome by a combination of methods like chromo-aluminum and chromo-silicon cementations.

► Ingot molds can now be water dipped and pitch coated every 2 min. Mechanized coating of ingot molds has been developed by the National Works plant of the National Tube Co. and uses less than 1/2 lb of prepared coal tar pitch per ton of ingots.

► Prospective earnings will be the primary yardstick in fixing prices of steel plants, Surplus Property Administrator Symington reported to Congress. For the government to attempt to get more than a price measured by earning power, regardless of what the facilities cost, will hamper sales and lessen financial return to the government.

As for the Geneva plant, Symington sees in the limited number of disposal prospects apprehension concerning the possibility of a reasonable price or acceptable financing arrangements.

► Reports of radically new trends in auto engine design are coming out of Detroit. Skinner Motors, aided by Jack and Heintz have developed a 2-cylinder, horizontally opposed engine with cylinder section of precision diecast aluminum assembled by welding. Weight of cylinder section is said to approximate 50 lb. and is expected to develop 28 hp.

Immediate Hudson production will call for a 6-cylinder, 4-door sedan in two distinct style lines. Later there will be broughams and club coupes and a cab pickup vehicle. An 8-cylinder line in both style series will be procured as soon as possible.

GAS CARBURIZING

. . . This three part article on carburizing in gaseous media in addition to reviewing the existing literature on the subject contains valuable information on the application of this theory to practice. This first part begins with a general summary of carburization and decarburization and then discusses the choice of steel for best results and the effect of grain size. In subsequent articles, the various gaseous media, mechanism of carburization and heat treatment of carburized parts will be considered. The opinions and assertions contained in this article are those of the author and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

° ° °

By ERNEST S. KOPECKI
Lieutenant, U.S.N.R.

° ° °

THE process of carburizing is applied to finished or semi-finished articles of ferrous metals with the object of increasing the carbon content of the surface so that when subjected to suitable heat treatment, the surface portion so carburized will be substantially harder than the underlying metal. Thus, a low-carbon steel article which in its original condition will harden but little on quenching, can be carburized and then quenched, producing a hard, strong, wear-resisting surface and a soft, tough interior. The combined process of carburizing followed by hardening is known as case hardening.[1]

The fatigue strength of steel is increased in carburization because the strength of the outer layer (in a fatigue test the outer surface is the most highly stressed) is increased and because this layer is highly stressed in compression (due to thermal contraction on quenching and to the increased volume of the hardened layer).[2]

Commercial carburizing may be accomplished by any one of the following methods: (1) pack carburizing, (2) liquid carburizing or (3) gas carburizing. In pack carburizing the work is heated in contact with a solid carburizing compound in a closed container. In liquid carburizing the work is immersed in a fused carburizing salt. In the gas method the work is exposed to the action of a carburizing gas in a heated chamber.[3] The function of the carburizing medium is to provide carbon in atomic or nascent form available for absorption into the steel.[4]

An important characteristic of gas carburizing is the ease with which the case composition can be controlled. By suitable adjustment of time, temperature and gas composition, the surface carbon and the carbon gradient can be varied to meet almost any requirement.[5]

Surface decarburization of carbon and low-alloy steels has always been a source of trouble and worry to the steel manufacturer and, in a much greater degree, to the machine designer and the metal processor. It is a matter of grave concern when a heavy steel part designed for a specific application and considered perfect from the standpoint of chemical analysis and physical structure fails due to the presence of a few thousandths of surface decarburization.

The notch effect of surface decarburization has been the subject of extensive study. It is well agreed that the heat treatment of steel parts results in setting up tension stresses in the outer decarburized areas as opposed to compression stresses set up in the main body of the steel. Consequently, when the steel part is work-stressed by loading, even below the theoretical designed load, the outer steel fibers will fail.

Thus the stage is set for early notch failure of the entire steel section. It is not uncommon for such failure to occur when machine parts are subjected to as little as 50 pct of the designed fatigue or torsion load stresses.[6]

Steels for Carburizing

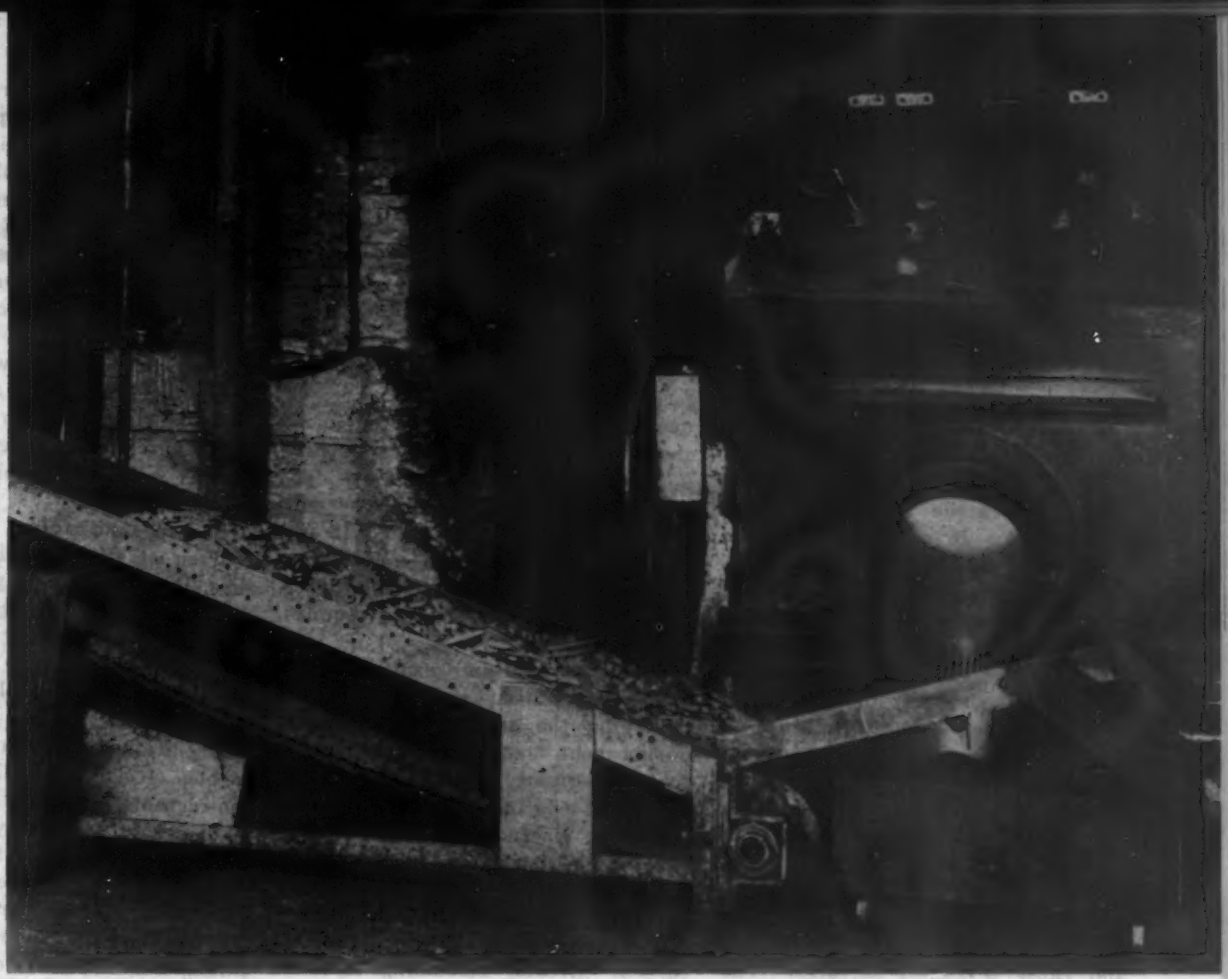
The reasons for which steels are carburized suggest the kinds of steel that would be used for the purpose. Carburized steels are always used in the heat treated condition and as such are termed case hardened. Case hardened steels are employed to meet the requirements of a very hard wear-resistant surface and at the same time a considerable degree of toughness in the core. Toughness in the core is obtained by keeping the carbon low, so for most purposes that element will be found below 0.25 pct.

Sometimes, however, a great degree of toughness is not required, but for other reasons a low carbon content may be desired. Steels of low carbon content require less expensive annealing operations to promote ease of machinability or may be cold formed into special shapes with greater ease, and for these reasons a case hardened part may be less expensive than a similar part made of high carbon steel.

Steels of high alloy content are not only more expensive in first cost and to machine, but may also have other undesirable characteristics, such as forming excessive amounts of austenite in the case when quenched, or undesirable massive carbides. These general requirements for carburizing steels limit their chemical compositions to plain carbon or moderately low alloy steels of low carbon content, or, in more special applications, to medium carbon content.[6]

Frey reports that medium-carbon steels with carbon content of 0.25 to 0.40 pct are being used and cases up to 0.030-in. depth are produced. Because of its composition, the core has potentially a wider range of physical properties than if made of low-carbon steel.[7]

To be used for carburizing, the steel must, of course, absorb carbon when



THIS carburizing furnace is equipped with an endless belt conveyor for handling hot pieces.

heated in a carburizing atmosphere but it must also do so at a reasonable rate, uniformly and reach a sufficiently high carbon content to harden satisfactorily. Since carbon is soluble in alpha iron to only a very limited extent, steels must be in the gamma form at the carburizing temperatures. Several alloying elements close the gamma loop, that is, prevent formation of gamma iron when steel is heated, and produce ferritic steels. Only 1 pct or less of aluminum, between 1 and 2 pct of vanadium or about 2 pct of silicon is required in pure iron.[2]

The next essential requirement after carburizing is that the case must harden satisfactorily in the quenching medium suitable for the part quenched. Many case hardened parts are used where distortion must be held to a minimum and wear resistance must be at a maximum. Water quenching is unsuitable for such parts as thin gears of intricate design, and they must be oil-quenched to decrease the amount of distortion. Consequently, plain-carbon steel, which will not harden sufficiently in oil, cannot be used and an alloy steel must be employed.[3]

After carburizing and hardening, the steel must have reasonable strength and toughness. These requirements involve the characteristics of the core as well as the case. To have suitable strength in tension, bending, shear and torsion or resistance to crushing of the case, particularly if the case is thin, the core must be high enough in carbon to possess the required strength. Alloying elements may be necessary in highly stressed parts or in large sections to develop the required hardness on quenching. On the other hand, carbon in the core must not be too high or the core hardness will be too great, resulting in brittleness, defeating one of the fundamental aims in using case hardening instead of high carbon steels. Another factor having pronounced influence on the toughness is the grain size of the steel. Fine-grained steels, especially in the low temperature single treated condition, are much tougher than coarse-grained steels.[4]

The steel must have satisfactory machining properties for the process used in machining even at the partial sacrifice of certain other desirable properties. This sacrifice should, of course, be kept in mind in choosing the application for the steel, or in the design of the parts so they will meet the strength and shock resistance requirements. Production or cost requirements may make it desirable to machine parts for case hardening on single or multiple spindle screw machines. It may be possible to anneal some of the lower alloy steels so that they can be machined in this manner but frequently openhearth, or even bessemer screw stock is used because of its superior machinability.

Although desirable for their high strength, carburizing steels of high alloy content may be unsuitable for difficult machining operations such as generating spiral bevel gear teeth or worm threads before carburizing or drilling or otherwise machining non-carburized sections after heat treating. The carbon content of the higher alloy steels must be kept low so that they can be annealed soft enough to machine without excessive tool cost.[5]

Quality of the Steel

The presence of impurities and other defects may greatly affect the ability of a steel to meet any, or all, of the requirements previously discussed; that is carbon absorption, hardenability, strength and toughness, and machinability. Sulphides and silicates have little if any influence on the rate or uniformity of carbon absorption during carburizing.

Alumina or other very finely dis-

persed insoluble material also may have an indirect effect on carbon absorption of diffusion. Such finely dispersed particles cause the grains to remain small at the carburizing temperature and the case depth in a given carburizing time is usually somewhat less in a fine-grained steel.[5]

This appears questionable in view of the work of Wells and Mehl[6] which shows that grain size has no effect on the rate of diffusion. It may be that the effect is only a microscopic illusion, as was encountered by Wells and Mehl.[6] The microscope showed an apparent low-carbon area, as the adjacent area. It developed that the low-carbon area was merely an abnormal structure (due to presence of alumina) and was deceptive under the microscope as compared to the adjacent normal structure.

Large amounts of impurities and banding in steel have an influence on the strength and toughness. Inclusions, themselves, are weak and brittle and also tend to produce a notch effect in the steel if they come out to the surface of the finished article.[5]

Large inclusions are not permissible in carburizing steels for many purposes because they nick and wear tools and cause scratched surfaces. The latter is an important point for such uses as gears where smooth finishes are required and the teeth are not ground after hardening. The inclusions giving the most trouble are abrasive in character and large, such as slag or pieces of refractory accidentally entrapped in the molten metal, or continuous, such as long silicate inclusions. On the other hand, the advantage in using bessemer screw stock comes from its free cutting properties due to the presence of inclusions. The sulphides, which are relatively soft and brittle, cause the chips to break off freely. For this reason sulphur may be purposely added and such steels as openhearth screw stock SAE 1115 and 1120 or free-cutting manganese steels X-1314 and X-1315 are used for carburizing.[5]

Carbon in Carburizing Steels

Because the carbon content of the steel remains unchanged in the core it is important for its effect on hardenability, distortion, strength and toughness as well as machinability or other forming operations.

Static strength increases directly with hardness (for which carbon is largely responsible when the steel is quenched) up to the point where excessive hardness results in high internal stresses since such stresses are not fully removed by the low drawing temperatures necessarily employed. Toughness or shock resistance decreases with increased hardness beyond a certain point, defeating one of the primary aims of case hardening; consequently in the majority of cases the carbon content of carburizing steels will not be higher than 0.20 to 0.25 pct. Toughness as well as strength may be adversely affected by very low carbon content. Carbon high enough to produce a uniform fine pearlite structure in the core on quenching gives greater toughness than one so low in carbon as to produce a heterogeneous mixture of ferrite and pearlite grains. The low limit usually found, 0.08 to 0.12 pct carbon, is set more by steelmaking processes and machining difficulties than by physical property requirements of the core.[5]

Carbon content and resulting hardenability are important factors in governing the amount of distortion during heat treatment. Low-carbon cores not greatly affected by quenching would tend to minimize distortion, especially where the volume of the core is large in comparison to the case. Intricate designs such as ring gears can be more readily held to shape by dies and presses if the core is low in carbon. Greater machining stresses produced in higher carbon alloy steels may be a minor factor in distortion caused by stress relief during carburizing. Design of parts, depth of case and method of treatment, must be considered also as it is possible to carburize steels of medium-carbon content at low temperatures by cyaniding or other light case methods and get as little or less distortion in the finished product than with low-carbon steels case-hardened by conventional methods.[5]

Machinability is affected by carbon content. Very low carbon steel, unless of the free cutting variety, is gummy and gives poor finishes. High carbon in combination with high alloy content develops high hardness, gives difficulty in annealing and increases tool cost. In general, however, machining problems are not the deciding ones in determining the carbon content to be used as they may be overcome sufficiently by normalizing or annealing methods. The combination of annealing and machining costs is an important factor in setting the upper carbon limit in high alloy steels.[5]

Carburizing Steel Grain Size

Grain size affects the machinability, suitability of heat treatments, distortion during hardening and physical properties of steels. Coarse-grained steels machine more easily and harden to a greater depth. Probably largely because of being deeper hardening they distort more during quenching. They are not suitable for direct quenching or for single low reheating below the Ac_3 point of the core if a high degree of toughness is desirable. Double treatment greatly improves the toughness. Particularly if the case contains coarse cementite envelopes, a single low reheat for quenching will leave a brittle case which may spall or chip on the corners under shock loads in service. Such a case is more susceptible to grinding checks also.[5]

Because fine-grained steels do not coarsen at the carburizing temperature, they give tough products when direct quenched or single treated at temperatures that do not affect the core grain size. They are shallower hardening and distort less. The case also does not harden as readily as in coarse-grained steels, and with plain-carbon steels, especially if there is considerable tendency toward abnormality, soft spots may occur. Low hardenability may be found in large sections of low alloy steels also. Fine-grained steels do not machine as readily but the difference can be eliminated to a great degree by normalizing at temperatures high enough to make them coarse-grained.[5]

Alloy Carburizing Steels

Alloy steels have certain characteristics which make them more suitable for certain applications than plain-carbon steel. In small sections the case of plain-carbon steels can be hardened fully as hard as alloy steels and consequently have good wear resistance. The core, however, is liable to be softer and weaker. Both the case and core are tougher in most alloy steels. The first advantage then of an alloy steel may be listed as greater toughness at equal hardness. A second important advantage of alloy steels is their lower critical cooling rate and consequent greater hardenability in commercial processes. This is important in two ways, one being the fact that satisfactory case-hardnesses can be obtained with large sections, the core at the same time being harder so that the article as a whole is harder, stronger and tougher. The other, and perhaps more important advantage of lower critical cooling rate in carburizing steels, is the fact that a slower cooling medium such as oil can be used to obtain satisfactory hardness.

The thermal gradients developed during oil quenching are much less marked than in water quenching and hence much less distortion occurs dur-

ing oil quenching. At least part of such distortion is due to internal stresses, and where high stress concentration occurs in notches, roots of splines and gear teeth, the steel is weakened and embrittled. Such stresses, of course, are not absent in oil-quenched steels but may be considerably lower.

Another advantage of some alloying elements is the low critical temperature resulting from their presence. This makes possible low quenching temperatures thus reducing scale, decarburization and warpage. Other elements form hard carbides and produce wear-resistant surfaces when a high-carbon case is obtained. An element which helps to retain hardness at high drawing temperatures is of value in some applications. In very special applications the superior corrosion resistance of higher alloys might be of service.'

Ed. Note—Next week the author continues with a discussion of gaseous media and the mechanism of carburization.

Non-Siliceous Molding Paints and Powders

AT the recommendation of the British Chief Inspector of Factories, an investigation was undertaken to find non-siliceous alternatives to silica flour for parting powders and mold and core paints. The results of this study are reported by W. J. Rees in a paper to the Steel Castings Research Committee of the British Iron & Steel Institute.

The initial series of experiments indicated that from the technical viewpoint, it would be practicable and efficient to use paints prepared from such non-siliceous materials as sillimanite calcined or fused alumina or china clay calcined to vitrification. A comprehensive series of trials with these and other materials was carried through in a number of steel foundries under ordinary conditions of foundry practice.

The technique of preparing the paint was found to need no modification when non-siliceous materials were used in place of silica flour with the same suspensory agents, but small modifications in the density of the paint might be desirable to suit individual foundry practices.

A fundamental difference between silica and the non-siliceous materials used in the trials is that the former expands at high temperatures, above 2678°F. It was shown, however, that silica paint mixtures underwent a small shrinkage at high temperatures, owing to drying and sintering, when test pieces prepared from the paint mixture with 7 pct of water were dried and fired at 2912°F. A series of tests indicated that the shrinkage of fused alumina and zircon paint mixtures at high temperatures is about the same as that for silica, but is much greater for calcined china clay. Further laboratory work and foundry trials are necessary before the effect of this characteristic, which will be affected by the particle size of the material, can be evaluated. It may be of more importance with large than with small castings, as one non-siliceous material which shows a much higher shrinkage than silica in the above test has given completely satisfactory results with small and medium size castings.

The non-siliceous materials which have been used in foundry trials include vitrified china clay, calcined aluminous fireclay, sillimanite, calcined alumina, fused alumina or alundum and zircon. All were used in the flour condition, the specific surface being in the range of 4746 to 14,240 sq ft per lb.

The trials made with mold and core paints indicate that silica flour can be satisfactorily replaced by non-siliceous materials. Calcined ball clay or aluminous fireclay is satisfactory for small or medium steel castings; for larger castings, sillimanite, calcined or fused alumina and zircon have given satisfactory results. The choice of the most suitable alternative depends on the particular condition of foundry practice.

Surplus Material Identification

FOR ready identification of obsolete war materials an interesting procedure has been developed by the Chicago Vitreous Enamel Product Co. Builders of M-24 light tank and M-41 gun carriage sub-assemblies, this company has used photography as a means of simplifying its problem of surplus material disposal.

Principal feature of the system is a piece-part photograph showing the item, part number, and relative size as indicated by comparison with a ruler. At one glance the relative size, shape, and identifying ordnance number of any part can be established.

Storage of a wide variety of small, odd-shaped materials in a compact orderly fashion was accomplished by utilizing surplus shipping boxes. Packing slips with photographs of each of the parts in the box were then stapled to the outside. Warehoused to relieve overcrowded stockroom space, the material is readily available for disposal upon receipt of contractor's instructions.

A cross-referenced file record is kept, with a separate page devoted to each part, a photograph, description, usage, obsolescence history and such obsolescence factors as quantities, values, location and final disposition.

This use of photography provides a system of positive identification which can readily be used by personnel not intimately familiar with parts and blueprints, and greatly simplifies final disposition of surplus war materials.

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FIG. 1—Obsolete war material is boxed for storage. Photograph stapled to box provides ready identification of size, shape, and ordnance number.

Conveyorized Non-Decarburizing

By W. J. BORNHOLDT
Chief Metallurgist,
Caterpillar Military Engine Co.,
Decatur, Ill.

and

H. E. SCARBROUGH
Industrial Heating Specialist,
General Electric Co.,
Chicago

A HEAT treating installation in which parts carburized before hardening do not suffer decarburization and which permits the automatic quenching of large and intricate parts without damage to the finish-machined surfaces has been in operation at the Victory Ordnance Plant of the Caterpillar Military Engine Co., Decatur, Ill. In fig. 1 are some of the miscellaneous gears, pinions, splines, starter ring gears and other finish-machined parts as they appear before heat treatment.

The complete heat-treating equipment consists of a conveyor-type, scale-free hardening furnace, which is used for heating the parts prior to oil quenching; a deep oil-quench tank holding approximately 7000 gal of quenching oil; a washing machine for removing the quench oil prior to drawing; an air-recirculating type continuous draw furnace; and equipment for producing a non-decarburizing protective atmosphere which is used in the hardening furnace.

The general arrangement of the equipment is shown in fig. 2. The protective atmosphere generating equipment is installed above the quench tank discharge conveyor, occupying the space between the hardening furnace and the end of the quench tank discharge conveyor.

Shown in fig. 3 is the charging end of the hardening furnace, where by means of a tray-type loader, miscellaneous small parts are placed into the hardening furnace. Larger parts that cannot be handled by the tray loader are placed into the hardening furnace

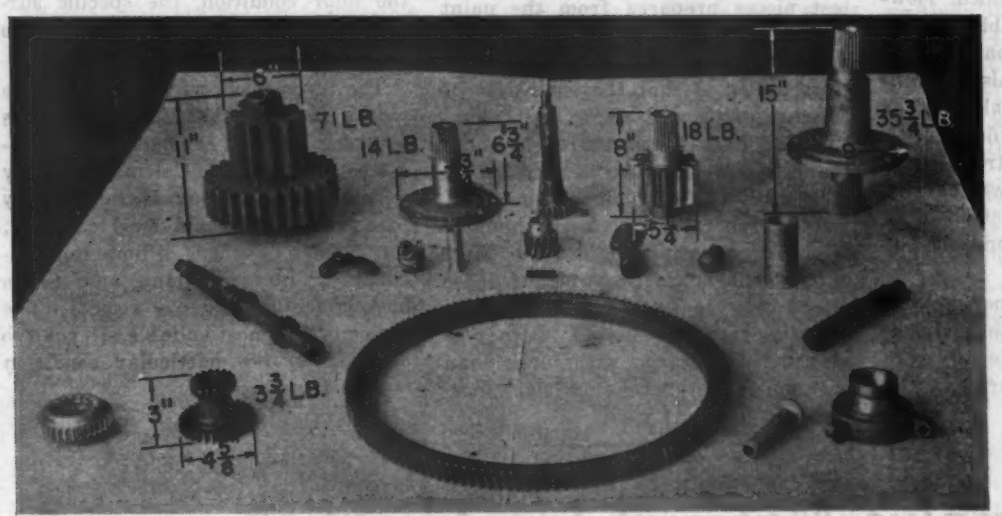
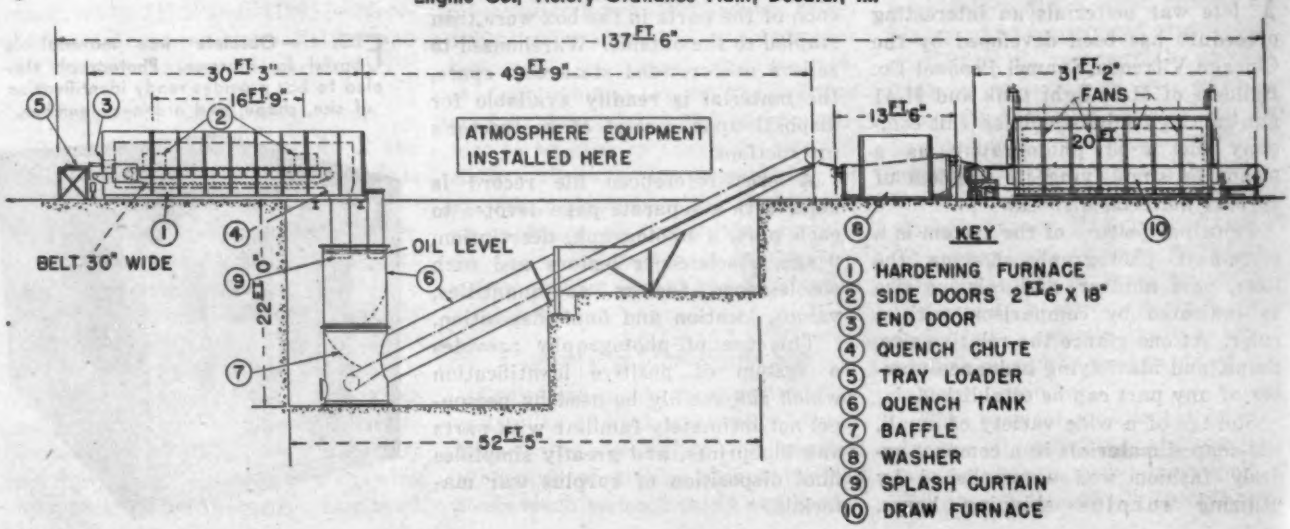


FIG. 1—Miscellaneous tractor parts having finish-machined surfaces which are scale-free hardened without decarburization and drawn in G.E. conveyorized furnaces. With the exception of the large ring gear and the heavier pinions all parts shown are automatically quenched.

FIG. 2—Elevation showing arrangement of conveyorized furnaces, quench tank and washing machine at the Caterpillar Military Engine Co., Victory Ordnance Plant, Decatur, Ill.



Heat Treatment of Gears . . .

. . . By the continuous method of heat treatment here described, the authors furnish data on how average costs have been cut in half against those of other methods. Cleaning and tin plating to overcome scaling have been eliminated.

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through the side charging door, also shown in fig. 3.

Most of the parts treated in the furnace are dropped directly from the furnace conveyor into the quench tank. Typical of the parts which are automatically quenched are those shown in fig. 1, excepting the large ring gear and the 71-lb double pinion, which are hand-quenched. It will be noted, however, that automatic quenching is used for various types of finished gears and splines up to and including 35¾-lb pieces. These parts, which drop directly from the hardening furnace conveyor through a steel chute into the quench tank, pass through about 14 ft of quenching oil before landing on the quench tank discharge conveyor. Distortion and nicking of these parts is prevented by allowing them to fall onto a series of oil-immersed, synthetic rubber-covered baffles that not only greatly reduce the impact with which parts strike the quench conveyor, but also give the parts a tumbling motion and a longer time of travel through the quench oil before coming to rest on the quench tank conveyor.

In addition to these baffles, the tank is equipped with an oil recirculating system that bathes parts landing on the quench conveyor with a high velocity flow of oil. Oil temperature is regulated by means of a separate oil circulating, cooling system.

Due to the size and weight of the parts that are dropped from the hardening conveyor into the quench tank, it is necessary to prevent the splashing of oil upward into the furnace. Such splashing is eliminated by use of a high velocity deflecting oil curtain located just under the surface of the oil struck by the falling parts.

The large 71-lb double pinion is manually removed from the furnace through the side discharge door. It is then picked up by means of a special quench fixture and taken to the external opening of the quench tank. The operator immerses the gear and runs the hoist up and down for a predetermined time, to cool the gear sufficiently, after which the hoist is allowed to lower and strike a stop, tripping a spring-operated plunger and releasing the pinion from the fixture. The pinion drops onto the rubber-covered baffles in the quench tank and thence onto the quench tank conveyor.

Shown in fig. 4 is the discharge end of the quench tank conveyor with a 71-lb double pinion ready to drop onto a synthetic rubber-lined chute from which it is manually arranged on the conveyor of the Blakeslee washing machine. After removal of oil during passage through the washing machine, the parts are again discharged onto a synthetic rubber-lined chute from which they are manually arranged on the draw furnace conveyor, as shown in fig. 5.

The large starter ring gear shown in fig. 1 is manually removed from

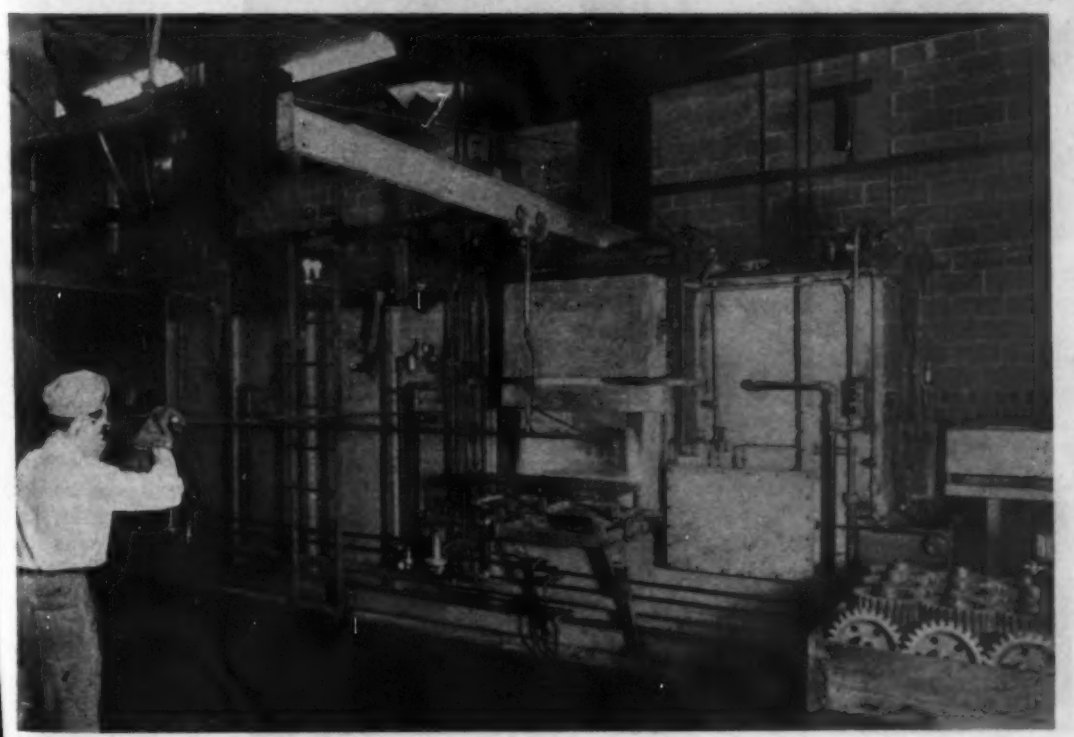

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FIG. 3—Method of placing large, heavy gears into hardening furnace. The same fixture and monorail are used to remove the gears through a side door at the discharge end. The tray-type loader for miscellaneous small parts is shown at right.

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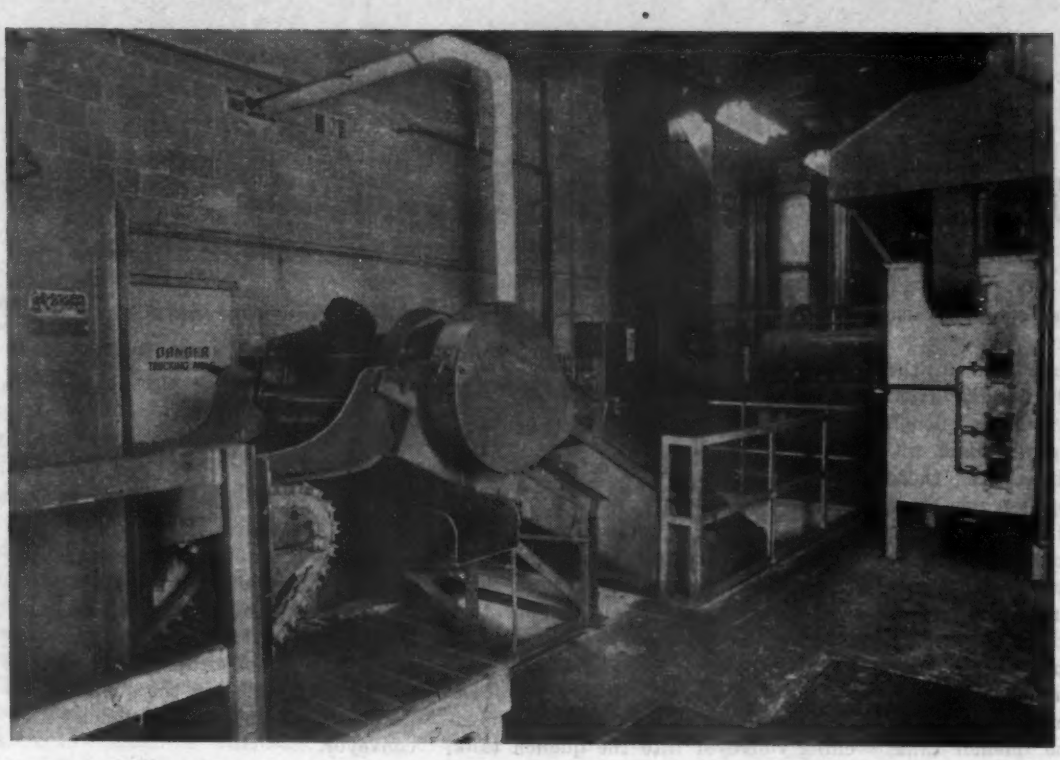


FIG. 4—Discharge end of quench tank conveyor with a 71-lb double pinion gear about to be discharged onto the conveyor of washing machine. The protective atmosphere generating equipment located above the quench tank can be seen at right

the side discharge door of the hardening furnace and quenched in a Gleason machine. After quenching, the gear is put through the washing machine and draw furnace, as are all other parts which are treated.

The draw furnace illustrated in fig. 5 consists of a 30-in. wide mesh belt conveyor passing through a heating chamber having inside working dimensions 20 ft long. The draw furnace is equipped with four high-volume recirculating fans, each driven by a separate motor. The inside of the furnace is so baffled that positive recirculation of air is obtained, resulting in fast and uniform heating for the drawing of parts at temperatures adjustable from 250° up to 1200° F.

The entire equipment was designed

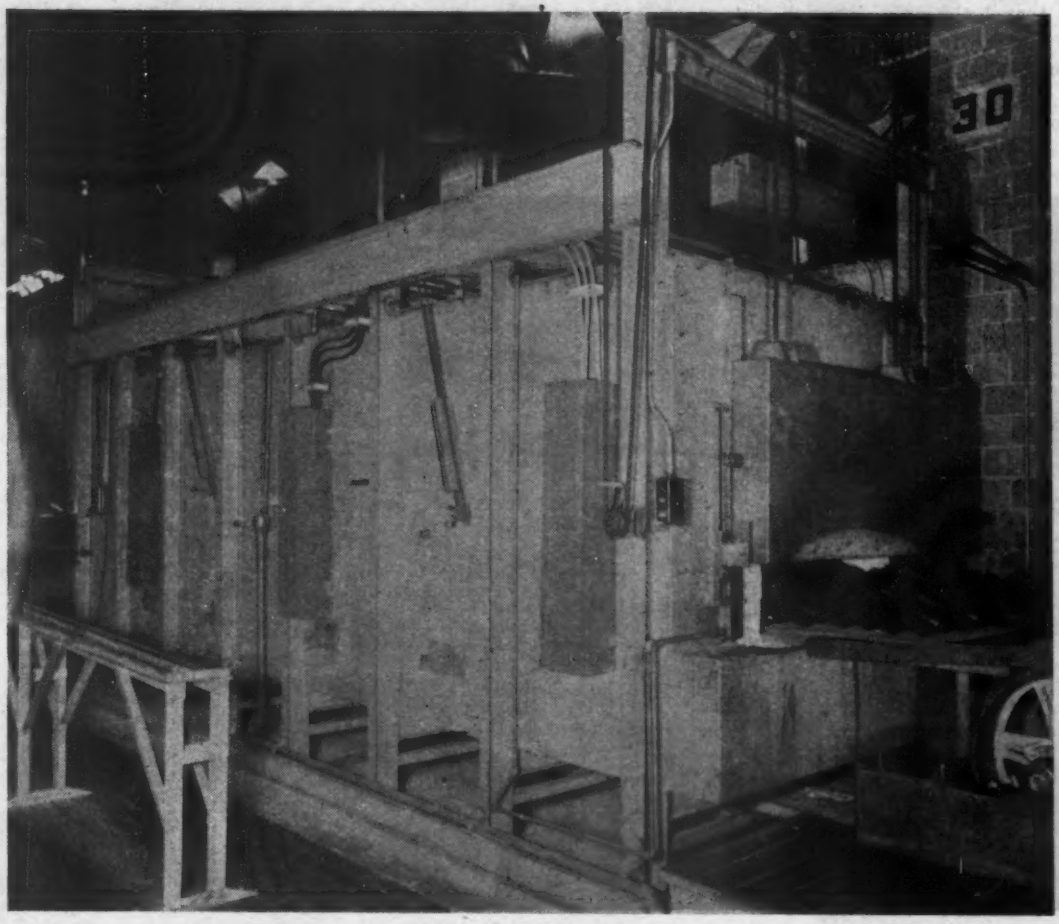


FIG. 5 — Large double pinions which have been manually arranged on conveyor after leaving washing machine entering draw furnace.

to harden, wash, and draw a maximum of 1500 lb per hr. When heat treating parts that can be discharged directly from the furnace conveyor, one operator and two helpers can very easily handle the entire equipment. Comparing this with most conventional methods of heat treating cut gears, it will show a tremendous reduction in handling labor. It should be noted that one operator and two helpers can harden, wash, and draw up to 1500 lb of finished parts per hr.

When heat treating the large 71-lb double pinions, two men are required to operate the furnace, and one man to operate the washing and drawing equipment. In 8 hr, with one operator and two helpers, a total of 128 of the double pinions can be hardened, washed, and drawn. This compares very favorably with the former method of heat treating in batch type furnaces, where two men handle only 32 of these parts in an 8-hr day.

When the furnace is treating the 18-lb single pinion, which is automatically discharged into the quench tank, two men operate the complete equipment. One man loads the hardening furnace while the other man takes care of the washing and drawing equipment. In 8 hr, two men can heat treat 304 of these pinions, this being about double the production handled in the same manhours with former methods of heat treatment.

The double spline shaft illustrated in the upper right-hand corner of fig. 1, which weighs 35¾ lb is hardened, washed and drawn at the rate of 24 pieces per hr, using one operator and one helper. This compares very favorably with the rate of 8 pieces per hr when the parts are treated in pit-type furnaces, using the same amount of labor.

The double gear, illustrated in the lower left-hand corner of fig. 1, which weighs 3¾ lb, is hardened, washed, and drawn at the rate of 114 pieces per hr, using one operator and two helpers, as compared with a rate of 52.8 pieces per hr when treated in a rotary hearth furnace, which takes care of the hardening only, and does not include the drawing.

As yet, sufficient cost data are not available to make definite statements regarding savings effected by the continuous method of heat treatment. However, data which are available indicate that the average cost of heat treatment has been at least cut in half.

In addition to the reduction in the cost of heat treatment, quality and uniformity have been increased to the point where rejects have practically disappeared. With the former method of heat treatment, the surface of the parts was slightly scaled and had to be cleaned and tin plated. It has been found that with the use of this equipment, the cleaning and plating can be eliminated.

Fusion Brightening of Electro-tinplate

AT the Armour Research Foundation of Illinois Institute of Technology, a device permitting microscopic observation of a tinplated surface during the process of fusion has been developed, according to Howard J. Francis, physical chemist at the Institute. By attaching a 16-mm motion picture camera to the microscope, a photographic record of the fusion is obtained. The illustrations shown here are taken from such a film.

The slow advance of a typical fusion line across the field is shown in fig. 1. The matte finish is shown on the left and the smooth liquid surface of the fused tin is on the right. Fig. 2 shows the same specimen a few seconds later. Tiny craters have appeared in the liquid surface, suggesting the evolution of gas from the base metal. These craters seem to form nuclei for the general dewetting of the base by the tin.

A later state of the dewetting phenomenon is illustrated in fig. 3. The molten tin is beginning to shrink into beads, leaving relatively large areas of dry base. The final stage of the beading process is shown in fig. 4. In commercial production, of course, the molten tin is quenched soon after fusion. It is only when the strip is heated to too high a temperature or held in the molten state too long that the dewetting and beading become serious.

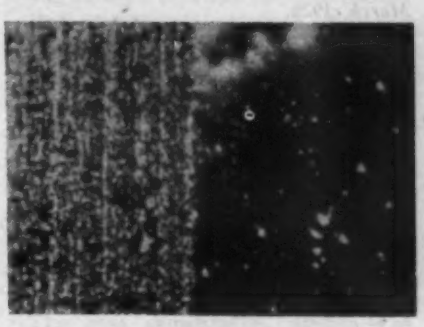


Fig. 1

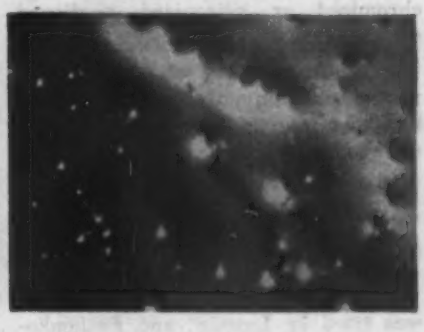


Fig. 2

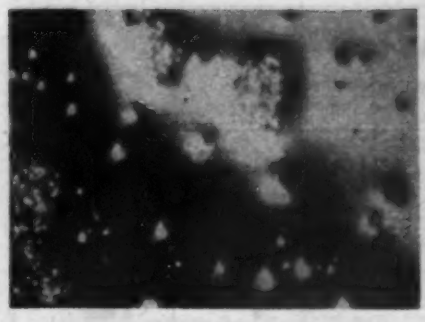


Fig. 3

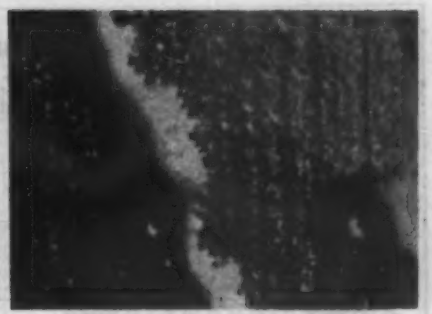


Fig. 4

FIGS 1, 2, 3 and 4—The successive stages in the fusion of electro-tinplate, illustrating the dewetting of the steel by the tin. Approximately 60 X.

Chromium, Silicon and Aluminum

CEMENTATION of steel with aluminum is being widely applied in Europe to steel parts operating at high temperatures. Chromium and silicon cementation have been carried out only on a laboratory scale.

Experiments have shown that chromizing greatly increases the corrosion resistance of steel in water and nitric acid solutions. Siliconizing enables metals to resist nitric, sulphuric and hydrochloric acids. Moreover, it imparts to steel additional heat-resistant qualities and is distinct from aluminizing as parts can be deformed plastically and therefore bent and polished. When the cementation layer is sufficiently deep, slight machining is possible. Latest literature and patents show that siliconized steel is highly wear resistant. Chromized steel possesses analogous technological properties.

Surface treatments by chromizing and siliconizing (or Ihrigizing) are very promising as they permit the substitution of critical highly alloyed stainless and heat resistant steels by chromized or siliconized unalloyed steel or iron.

The establishment of methods and procedures for chromizing and siliconizing was the object of the study undertaken by the author.

For other articles on chromizing, see THE IRON AGE, *issues of Oct. 22 and Nov. 26, 1942.*

Cementation of steel in powders was tried by Laissis[1], and Feshenko-Chapovsky[2]. The process of gaseous chromizing was studied by N. A. Isgarishev[3], A. Sarkisov[4], and V. N. Arharov. A rather complete research survey of powder cementation was performed by V. E. Nicholaev[5]. In the field of gaseous chromizing E. M. Rafalovitch[6] gives a very good summary.

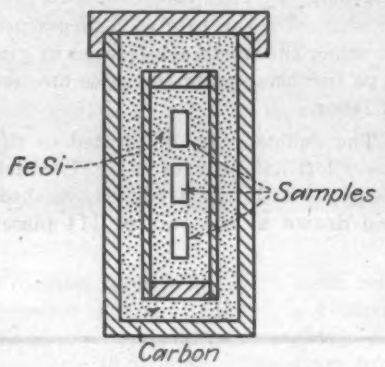


FIG. 1—Method of packing samples in a double muffle.

[1] *I. Laissis, Revue de Metallurgie, March,* 1926.

[2] *Feshenko-Chapovsky, JRMO (Journal of the Russian Metallurgical Society), No. 2,* 1928.

[3] *N. A. Isgarishev, Izvestia Akademia Nauk USSR, Chemical Division,* 1941, *No. 8, p. 673.*

[4] *A. Sarkisov, Journal of Applied Chemistry (Russian),* 1939, *No. 12, p. 487.*

[5] *V. E. Nicholaev, Corrosion of Metals (Russian),* 1931, *p. 72-95.*

[6] *E. M. Rafalovitch, Stal* 1942, *No. 7-8, p. 42.*

TABLE I

Influence of Silicon Content in Ferrosilicon
(24-hr cementation at given temperatures)

Composition of Mixture	Depth of Layer, In.	
	1860° F	2040° F
Ferrosilicon containing 45 pct Si	0	0.0020*
Ferrosilicon containing 75 pct Si	0.0020*	0.0120*
Ferrosilicon containing 90 pct Si	0.0040*	0.0120*
¾ ferrosilicon containing 45 pct Si + ¼ firebrick	0	0.0020
¾ ferrosilicon containing 75 pct Si + ¼ firebrick	0.0012	0.0080
¾ ferrosilicon containing 90 pct Si + ¼ firebrick	0.0020*	0.0120*

* These samples on subsequent tests showed good corrosion resistance.

The results of current work in the sphere of chromizing in general agree with the work of the above mentioned researchers. Therefore, only Ihrigizing is discussed in this article.

The fundamental experiments, carried out as shown in fig. 1, aimed at establishing the composition of the cementation mixture. The influence of the silicon concentration in the ferrosilicon mixture was investigated by using 90 pct, 70 pct and 45 pct ferrosilicon of a grain size between 20 and 30 mesh to which was first added 25 pct of pulverized firebrick. Later experiments were run without firebrick. Results of a 24-hr operation are given in table I.

As might be expected, the intensity of cementation apparently increases with the concentration of silicon in the mixture, best results being achieved with 90 pct ferrosilicon. Mixtures of 45 pct ferrosilicon and lower become ineffective. Since 90 pct ferrosilicon was not readily available, all further research had to be performed with 70 pct ferrosilicon.

A second series of experiments was devoted to establish the effect of grain size, and steel samples were treated with agents of varying grain size (table II).

Surface and microscopic analysis of the samples demonstrated the following limitations:

Best cementation results are achieved with a smaller grain size. However, at high temperatures the small-grain powders have a tendency to bake and adhere to the cemented surface, corroding it. No sticking occurs only when ferrosilicon of 12 to 20 mesh is applied at a temperature not higher than 1860° F, but neither is there any cementation. Addition of 20 to 25 pct of ground firebrick to the ferrosilicon prevents baking but impedes cementation. At 1860° F the 12 to 20-mesh grain produces no silicon case, and at 2040° F the process is very slow.

Generally speaking, the adherence of the mixture to the surface of the steel aids the cementation process, but mars the surface. Best results are obtained by a mixture of 75 pct ferro-

Impregnation of Steel . . .

. . . Methods and procedures for impregnating steel with chromium, silicon and aluminum have been investigated by A. M. Borzdika and reported in Stal, No. 7-8. An abstract and translation of this report by T. Cosman is given herein.

silicon and 25 pct of firebrick of a grain size of 20 to 30 mesh.

The influence of the temperature on siliconizing is seen in table II. At 1860° F the process is too slow, a case of 0.0012 to 0.0020 in. being obtained in 24 hr. The lowest possible temperature is 2040° F, which agrees with earlier experiments[7].

It is interesting to compare the lowest cementation temperature of steel with metals other than silicon. A cementation layer of 0.004-in. depth can be obtained in 5 to 6 hr at the following temperatures:

Aluminizing	1680°F
Chromizing	1860°F
Siliconizing	2040°F

The high temperature renders cementation with silicon and chromium powders extremely difficult. It also necessitates subsequent heat treatment to refine the large grain of the product, which is not always possible. These circumstances made an investigation of the possibilities of gaseous cementation mandatory.

GASEOUS CEMENTATION: Gaseous cementation with metals uses chlorine compounds as catalysts for the respective metals, i.e. chromium chloride $CrCl_3$, aluminum chloride $AlCl_3$, and silicon chloride $SiCl_4$. These gases are easily produced by applying chlorine, hydrochloride or hydrochloric acid at high temperatures to the respective metals or ferro-alloys. $AlCl_3$ can be made by mixing NH_4Cl with powdered aluminum.

The process of gaseous cementation with chlorides can be pictured as follows: At a sufficiently high temperature the gaseous chlorides dissociate and deposit the metal radical on the surface of the steel part in an atomic condition which then diffuses into the steel.

SILICONIZING: H. K. Ihrig[8] describes siliconizing of steel in a chlorine atmosphere where cementation is considerably more intensive. This process was checked experimentally, and the laboratory setup for siliconizing in a chlorine atmosphere is given in fig. 2. Samples were examined microscopically.

The following factors were varied in the experiment:

(1) Cementation agent was 45 and 70 pct ferrosilicon, silicon carbide and 70 pct ferrosilicon, and finally alone.

(2) The grain size of the cementation agent was—20 to 30, 7 to 12, and bigger than 7 (approximate mesh size).

(3) Steel samples cemented were steel containing 0.1 to 0.2 pct C, 0.4 C, and 0.9 pct C.

(4) Temperature of the process was 1680° F, 1740° F, and 1860° F.

(5) Exposure time was 4 hr in all cases.

In some experiments the samples were completely surrounded by the cementing agent, but in others they were placed away from it in the unoccupied space of the muffle. Experiments showed that the samples should preferably be placed at a distance from the agent.

The following can be observed from the results achieved: In the presence of chlorine the process of cementation is several times faster and takes place at 1680° to 1860° F, the best temperature being 1740° F. An exposure of 4 hr gives a cemented layer a depth of 0.015 to 0.018 in., which is sufficient for practical purposes.

The best cementation agents are either pure 90 pct and 70 pct ferrosilicon or mixed with pulverized silicon carbide in the ratio of 1:1; 45 pct ferrosilicon, even with the addition of silicon carbide is of little value. Cementation is intensified with the smaller grain of the cementing agent; but small-grain powder bakes, seals the muffle and prevents the gas flow. Moreover, it corrodes the surface of the cemented samples if they are surrounded by the cementation agent. Small pieces, approximately 100 cu mm, are best used as cementing agents, and test pieces should be placed in a separate compartment.

The microstructure of the edge of a steel sample with 0.2 pct carbon that was cemented in a silicon chloride atmosphere at 1740° F will show a light silicon surface layer, representing a hard silicon solution in alfa-iron with a considerable silicon content, which according to Ihrig is 14 pct. A layer of almost pure pearlite follows. Deeper in the sample the pearlite changes and decreases. Such distribution of pearlite and ferrite is caused by the limited solubility of carbon in a silicon ferrite. This effect removes the carbon from the cemented layer toward the center of the sample.

The carbon content of the steel has

TABLE II

Influence of the Mesh Size of Ferrosilicon (24-hr cementation at given temperatures)

Composition of Mixture	Mesh Size	Depth of Layer, in. 1860° F	Depth of Layer, in. 2040° F
Ferrosilicon containing 75 pct Si	−12+20	0.0008	0.0040*
	−20+30	0.0020*	0.0120*
	−50	0.0040*	0.0260*
¾ ferrosilicon containing 75 pct Si and ¼ firebrick	−12+20	0	0.0020
	−20+30	0.0012	0.0080
	−50	0.0020*	0.0160*

* These samples on subsequent tests showed good corrosion resistance.

a considerable influence, and tends to impede the impregnation. The time necessary at 1860° F to obtain a cemented layer of equal thickness on steels containing 0.1 to 0.2 pct, 0.4 pct, and 0.9 pct C can be placed in the ratio of 1:1.5:2 respectively. At lower temperatures, 1680° to 1720° F, the ratio is even greater. The influence of carbon content of steel on the diffusion of silicon into the steel is noted by Cornelius[5].

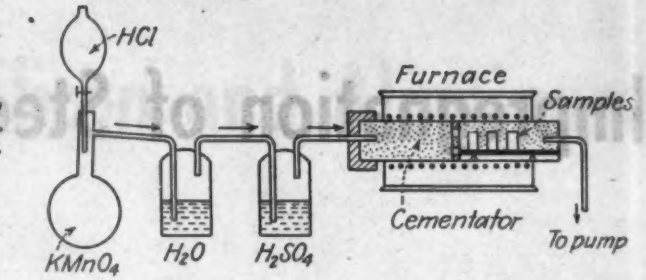


FIG. 2—Gas flow for the cementation of steel in a current of chlorine.

The influence of silicon is much more marked in a high-carbon steel where it displaces the carbon. A steel sample with 0.9 pct C siliconized for 4 hr. at 1740° to 1800° F will show a siliconized layer about 0.01 in. thick. As silicon eliminates the carbon, a cementation web is formed which adheres to the siliconized case. Based on a brittle backing the siliconized layer cannot be very strong, therefore it is impossible to siliconize a highly carbonized metal.

The influence of alloying elements on siliconizing was not studied here, but an experiment with low-alloy steel showed that it is possible to cement alloyed steels. However, the presence of such elements as nickel, at about 8 pct and chrome at about 1 pct impeded the diffusion of silicon.

A simultaneous cementation with chromium and silicon was conducted at 1740° to 1860° F with the following three factors altered: (1) chlorine, (2) the mixture of hydrochloride and hydrogen, and (3) using an atmosphere of pure hydrogen.

The two cementation materials used in a ratio of 1:1 were powdered chromium* and 75 pct ferro-silicon, either as powder, or in a 12 to 20 mesh size.

The combined cementation was performed in a similar manner as the silicon cementation (fig. 2). For working with hydrogen chloride the scheme was altered as shown in fig. 3. The same setup was used for the analogous process using an atmosphere of pure hydrogen but the retort containing hydrochloric acid was excluded. Cementation was more rapid in an atmosphere of chlorine.

	Cementation Depth, In.	
	In 8 hr	In 24 hr
Cementation in H_2	0.0028 to 0.004	0.006 to 0.008
Cementation MCl and H_2	0.008 to 0.010	0.016 to 0.020
Cementation Cl_2	In 4 hr = 0.016 to 0.020 in.	

This material was used in lieu of ferrochromium, the latter being preferable.

Apparently chromium and silicon chlorides are formed faster in chlorine than in hydrochloride.

A mild steel sample (0.3 pct C) cemented with chrome and silicon in an atmosphere of hydrochloride at 1765° F for 8 hr yields a case of 0.008 in. The same steel cemented at the same temperature, but in an atmosphere of chlorine for 4 hr, produces a layer of 0.016 in. to 0.02 in. thickness. The case is separated from the base metal by a characteristic light-colored line which resembles irregularly shaped hard crystals consisting of a solution of chromium and silicon in ferrite.

In siliconizing, the carbon contained in the steel migrates away from the siliconized case towards the center of the part[6,7]. When steel is impregnated with chromium, the carbon moves from the center of the steel towards the chromium, the faster the higher the content of carbon in steel[8]. Thus, in chromizing, a pearlite layer forms immediately beneath the shiny chromized case.

[5] *T. A. Deev, Vestnik Metalopromishlennosti* 1937, *No.* 16 17.
[6] *H. K. Ihrig, Metal Progress*, 1938, *No.* 4, *p.* 367-72.
[7] *H. Cornelius, Metalwirtschaft*, 1938, *No.* 10, *p.* 273-276.

In the combined chromium and silicon cementation, silicon impedes the migration of carbon from the center to the surface of the metal. Chromium, on the other hand, does not allow the carbon to travel into the steel. It can be supposed that a certain proportion the effects of chromium and silicon would balance each other and the migration of carbon atoms in the alfairon would stop. In that case the chromo-siliconized layer will probably be very close to the ferritic-pearlitic structure, being separated from it only by a thin ferrite belt.

This condition, therefore, speaks in favor of the composite process, rather than either pure chromizing or siliconizing.

Among the better-known commercial steels, iron-chrome-aluminum types such as Chromal, Megapir and others[10,11] have the highest heat-resistant qualities. Therefore, together with chromo-siliconization, another compound process was tried out, that is, the simultaneous cementation with chromium and aluminum. The process was conducted by the somewhat modified Martin[12] method. A chromium bearing agent was admixed to the cementing agent in different proportions.*

[10] *Bardenheur and Miller as reported in Metalurg (Russian)*, 1934, *No.* 3.
[11] *A. M. Bordzika, Temperature Resistance and Heat Capacity of Steels (Russian), ONTE*, 1936.
[12] *P. Henry, Revue Generale de Sciences*, 37, 1936, *p.* 434.

The comparative heat resistance of the various metal coatings is shown by the following limiting temperatures**:

Chromized	1580°F
Siliconized	1680°F
Chromo-siliconized	1860°F
Chromo-aluminized	1920°F
Aluminized	2000°F

Chromo-aluminum cementation not only gives the same heat resistance as straight aluminizing, but it also has greater technological advantages.

This part of the work has not been concluded. Therefore the optimum temperature and cementation agents cannot be given.

**These data refer to furnace atmosphere as they are commonly encountered.

Chromo-silicon closely resembles and is cheaper than chromo-aluminum cementation. It also does not impair the original material.

Conclusions

(1) Chromizing, siliconizing and chromo-siliconizing in powder form has disadvantages, such as the high temperatures and the long infusion period. These shortcomings can be eliminated to a certain degree by gaseous cementation, which is recommended for industrial purposes.

(2) Gaseous cementation of steel parts with chromium, silicon and aluminum is done in an atmosphere of the chlorine compound of the

metal. These chlorides act as catalysts, they are passed together with the HCl or Cl_2, over the steel part at 1680° to 1980° F.

(3) Chromizing and siliconizing, when applied by themselves, bring the corrosion resistance of unalloyed steels up to that of solid stainless steels. At high temperatures and in corrosive gases the infusion treated steels have a limited corrosion resistance (heat resistance). In order to substitute them for the highly alloyed heat-resistant steels, the best products can be obtained by a combination of methods, that is, chromo-aluminum and chromo-silicon cementations.

(4) Both carbon and alloy steels can be siliconized or chromized but the carbon content should not exceed 0.5 to 0.6 pct. Other conditions being equal, a low-carbon steel is preferred to one containing excessive carbon and unalloyed is preferred to alloyed steel.

(5) On the basis of results obtained, a two-retort furnace with a working temperature of about 1860° F for gaseous cementation has been designed as well as an apparatus for the extraction of chlorine by electrolysis of common salt. This setup is sufficiently simple to be installed in any manufacturing plant.

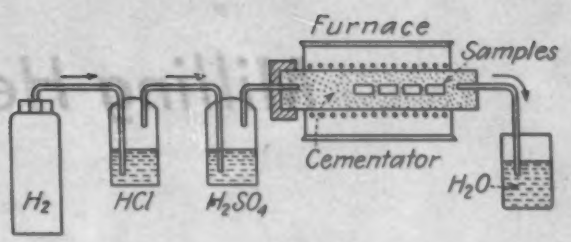


FIG. 3—Cementation of steel in hydrochloric acid.

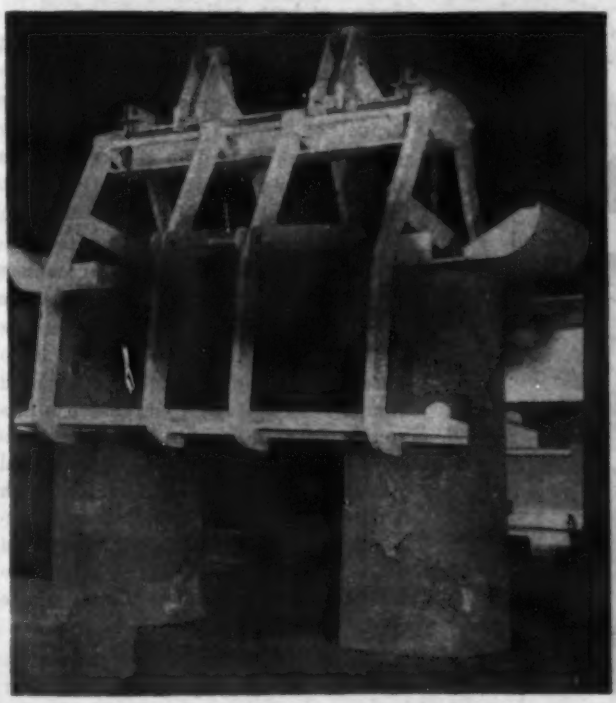
Mechanized Coating of Ingot Molds

A METHOD of mold preparation which uses less than ½ lb of prepared coal tar pitch per ton of ingots has been developed at the National Works plant of National Tube Co., a U. S. Steel Corp. subsidiary. Using the new setup, three big-end-down 23½ x 26½ x 80-in. ingot molds can be water-dipped and pitch-coated every 2 min. A very substantial decrease in scrap and scarfing has resulted, and the coating is considered superior to any previously secured with tar, fuel oil, graphite or brine.

The operation consists of picking up three hot (300° to 500°F) molds by means of a special lifting rig attached to the 15-ton mold yard crane, dipping the set into water to remove any dirt and then positioning them on a special spray platform. The mold lifter, seen in fig. 1, is lowered until the cover plate, suspended by chains within the frame work of the lifter, rests on top of the molds. Compressed air then blows in the powdered coal tar pitch through three conical depressions centered under the molds in the base of the platform. The cover plate keeps all but a small part of the pitch from escaping into the atmosphere.

A uniform coating from top to bottom of the mold is obtained with 85 to 95 psi air pressure delivering the powdered pitch through a 2-in. pipe. At this pressure only 5 sec is required to produce a coating of sufficient thickness in the mold to repel steel splashes during teeming, and provide the agitation necessary to prevent nonmetallic scum from being trapped in the ingot surface. Exact control of the flow to each of the three molds is obtained through a motor-operated cam arrangement that opens three quick-acting air valves, one at

(CONCLUDED ON PAGE 176B)



LEFT

FIG. 1—Special lifting rig positioning molds on spray platform. Compressed air blows powdered coal tar pitch through conical depressions centered under the molds in the base of the platform.

RIGHT

FIG. 2 — Control setup for mold preparation at National Works plant, U. S. Steel Corp. Timing of air blast is accomplished by cams. Individual operation of any of the three blasts can also be controlled manually by means of valves.

Milling Heavy Sections of 14ST

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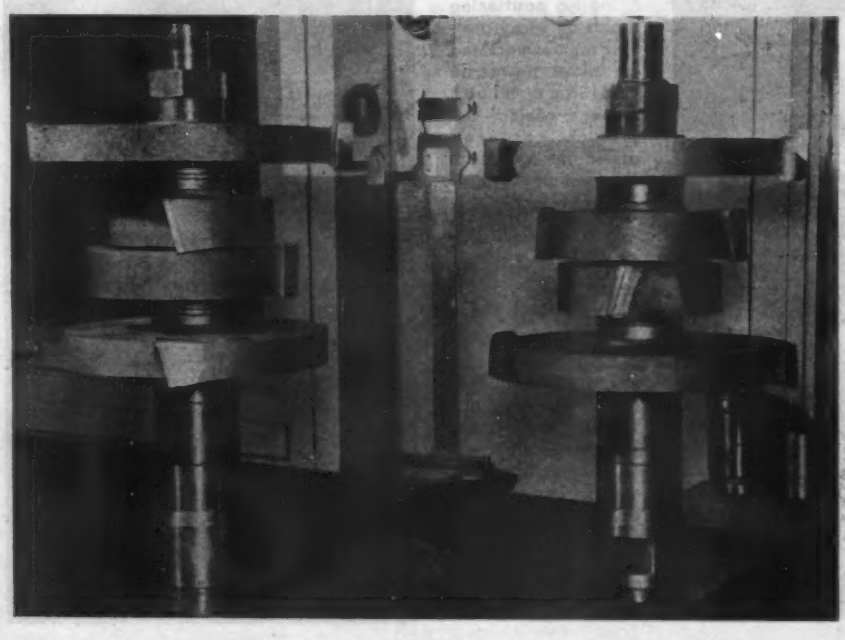
RECENT developments of new, light-weight, high-strength alloys of aluminum, and the application of highly heat-treated steel alloys to aircraft production have presented this industry with many exceedingly complex machining problems. Among these, the difficulty of producing large wing spars from forged or extruded sections of the strongest aluminum alloy at a high rate of speed was one of the most pressing.

The Onsrud heavy duty milling machine was the machine tool industry's answer to the call for a sufficiently large and rigid machine with adequate power to turn straddle milling cutters at extremely high speeds and at a relatively high rate of feed. The design of cutters to make use of the machine's production potentialities to the maximum extent was, however, an entirely different problem, and one to which Northrop devoted a great deal of research. It was necessary to develop tools which would utilize the full power of the machine, possess a reasonable life between grinds, and at the same time produce a satisfactory job and maintain production schedules.

Prior to the war 17ST alloy was the principal material used for aircraft structural material, but since production requirements were so low, and since the material itself was relatively easy to machine, there was no necessity for special machining research. The introduction of the harder, tougher 24ST alloy, however, coupled with the demand for accelerated war production, necessitated a revision of almost all earlier production practices and ushered in a period of manufacturing research. More recently, the 14ST alloy has come to the fore as a wing spar material, and Northrop engineers found that rake angles and cutter clearances used on 24ST were entirely unsatisfactory for use on this alloy. It was necessary, therefore, to initiate a new research program using the best tool design practices applicable to other alloys, but modifying these according to the adverse properties of the new material.

The available equipment for horizontal milling could furnish 100 hp at the spindle, while that for vertical milling could furnish 60 hp, and it was decided to design the new tools for taking deep cuts. Using 2½-in. diam vertical cutters at 8250 rpm, a surface speed of 6500 fpm was obtained while with 5-in. to 10½-in. diam horizontal cutters, surface speeds of 3800 fpm to 8000 fpm were obtained. These speeds were considerably higher than had been used with 24ST alloy, but were found to be necessary for maximum production, and it may be stated that, in general, cutting speeds on the 14ST alloy should not be less than 4000 fpm. To provide adequate room for chip clearance, the cutters were made with but two teeth, since four-toothed cutters tended to load up with chips. This in turn permitted the use of thicker cutting points which offered a distinct advantage in strengthening the cutter tips, see fig. 1. This added strength was especially important because it was found necessary to mount the cutters at a 5° positive rake angle to successfully machine the new alloy which, from a machining standpoint, is stringy in nature, making it necessary to design the cutters to dig into the work. In addition, less load is brought to bear on the thrust bearings and less strain on the machine. Experience thus far has shown that cratering and pitting of the tools have not been serious.

FIG. 1—Set up of horizontal cutters showing two-tooth construction which provides adequate chip clearance and stronger tips.



Using carbide-tipped cutters at these high speeds, it was found possible to take a 1-in. cut with a surface travel of 30 in. per min, producing chips which varied in thickness from 0.002 in. to 0.005 in. depending upon the diameter of the cutter used. As may be seen in fig. 2, the horizontal machine was equipped with four cutters on a single spindle, making it possible to produce finish machined channels to very close tolerances. The high rate of feed and the high cutter speed made it necessary to increase the primary clearance angle to 7° on horizontal cutters and to 7½° on vertical cutters to avoid loading. On both horizontal and vertical cutters a secondary rake angle of 15° was found to be satisfactory, although this angle is not at all critical, and a side rake of 15° also proved suitable.

Cutting tests indicated that tools lasted longer and produced smoother

Aluminum Alloy

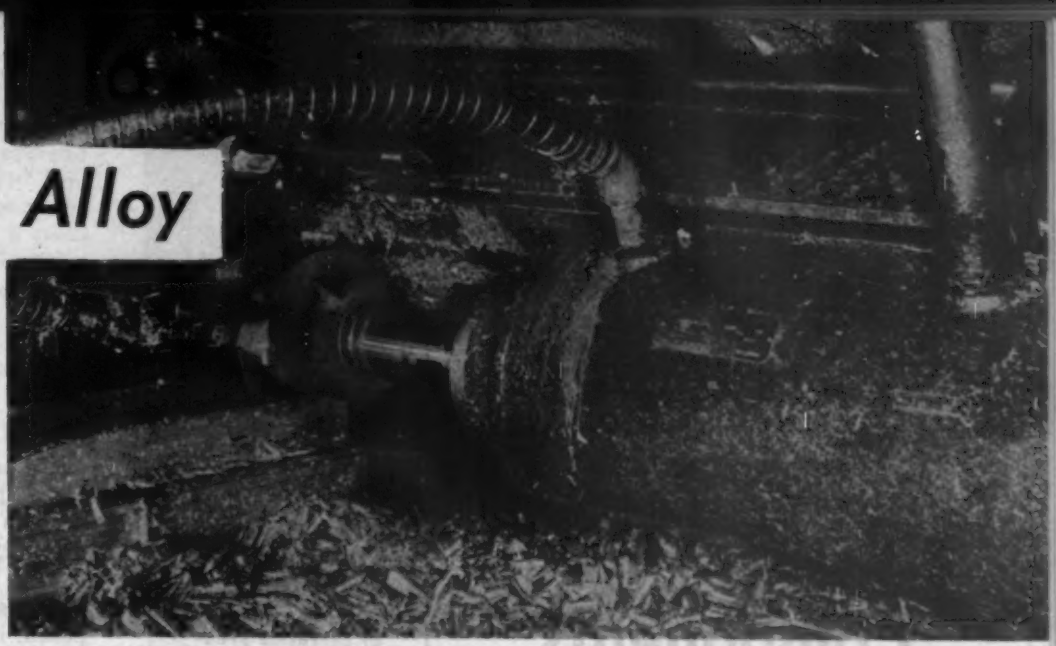


FIG. 2—Milling the top of the flange and the slot of a 14ST alloy wing spar.

machined surfaces if they were sharpened with a 100-grit diamond wheel, followed by honing. Finer wheels were found to load up, leaving a rougher finish on the parts, and even heating up themselves as a result of the friction of the bond on the cutter tips. This procedure does not conform to the accepted practice of using a finer grit wheel to produce a superior finish on the cutting edges of tools, but it has been found to give excellent results at Northrop. The grit size, the percentage of grit imbedded in the bonding material, the depth of cut and the coolant are all factors involved in these results, and further research is being carried out in this field.

The use of large extruded sections presented the problem of reducing the cross-section areas by approximately 65 pct, and since the material possesses a relatively harder and denser skin in comparison to the base metal or interior structure, the practice of taking deep single cuts in the initial machining operation was found to be inadvisable, since considerable warpage ensues. Subsequent straightening before the parts could be inserted into fixtures for further machining on other surfaces increases the hazards of breakage. It was found advisable, therefore, to machine such parts progressively, beginning with a light cut on all surfaces, not to exceed ⅜ in., although attempts are being made to relieve skin stresses by means of channels cut across the grain to a depth of ¼ in. where tolerances permit.

Good results cannot be obtained unless the cutters are kept sharp, and as a means of defining sharpness it was decided that when the abrasive action produced a wear of 1/32 in. in width on the primary clearance or land, such cutter should be considered unsuitable for further use without regrinding. Carefully balanced flywheels attached to the spindles were also found to be important in reducing vibration and producing smooth operation of the machine.

Both positive and negative rake angles were tried, but successful results were obtained only with positive rakes, and although the surfaces produced were very smooth, heavy burrs were left at the edges and ends of each surface, necessitating a deburring operation. Tool and cutter design will vary for each application, depending upon the material and its condition, and it is essential that research continue on this problem so as to permit utilization of all the advantages of the new high-strength alloys.

Interferograph Developed by Standards Bureau

DESIGNATED as an "interferograph," a new instrument which automatically records by a photographic process, measurements of minute dimensional changes in most substances during heating and cooling, has been designed by James B. Saunders of the Polarimetry Section, National Bureau of Standards, Department of Commerce.

The commonly used interferometer is being applied more and more widely to record minute changes in length which occur during the thermal expansion of various substances. For example, it is important to know what changes occur in dental materials when subjected to heat or cold. Enamelware is in common use and the expansion of the base metal must be carefully measured and compared with that of the coating material to insure adhesion and prevent chipping.

Visual observation of changes indicated by the interferometer is very fatiguing, and the limit of endurance of the observer is soon reached. Hence the need for a practical automatic recorder such as has been designed.

It is pointed out that for satisfactory photographic recording of thermal expansion data it is highly important that the design of the apparatus provide a means of making such instrumental adjustments as may be necessary during the recording period without destroying the continuity of the record. Other requirements are sufficient illumination without overloading the light source, constant and enduring illumination, light of high purity, and simplicity of operation.

The new interferograph fulfills these requirements and has been found fully satisfactory for both general and specialized interferometer work. The record of the length changes is produced on a strip of 35-mm film that is close to and moves uniformly past a narrow slit in the image plane of what is known as the fringe system.

With the interferograph, 200 easily readable fringes may be photographed on one meter of film. The amount of film used in an ordinary test is so small it can be processed in any dark room.

How to Protect Motor And Machine Components

. . . Exports shipments of consumer and capital goods can be protected from the ravages of time, climate and use, based on the experiences of the Army Service Forces with military goods. Here a description is given of the types of corrosion problems encountered and the means developed to minimize failures and deterioration.

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By CAPT. L. G. KLINKER
Army Service Forces, Office Of the Chief of Ordnance, Detroit

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DESIGNERS can learn valuable lessons from vehicles expended during the course of a war and many of these lessons may ultimately lead the way to a much improved civilian motor transport or passenger vehicle.

Operational deterioration can be broken down into two types, namely, mechanical deterioration and chemical deterioration. In this article only the chemical deterioration or corrosion will be considered.

When considering design for corrosion proofing it is necessary to keep in mind a few basic facts. When a metal deteriorates from chemical action, it does so in two ways: Either by direct chemical attack of its environment, such as gasses in the air, chemicals in the water, etc., or by an electrolytic cell action which involves the passage of a current from one portion of a metal surface through a conducting corrosion medium to another portion of the metal surface, and then through the main body of the metal to complete the circuit. Corrosion is evidenced by the deposit of the reaction sediment on parts, which usually complicate maintenance and may cause parts failure.

No discussion on corrosion would be complete unless there was some attempt to tie down the problem to specific parts, and by far the most susceptible components to corrosion in the motor vehicles are the electrical units. A great deal of work has been done on electrical components to seal entirely the parts from corrosive influences and moisture. This approach is the ideal and cannot always be reached in actual production. In addition, it must be remembered that no matter how well the attempt is made to seal a part, due to alternate rising and falling of temperature there is a breathing effect which will draw in moist air through the most minute hole. Thus, condensation will occur on the inside of such a sealed part even though the seal has been thought perfect. In this connection, the following specific examples are listed:

The hang-up of generator brushes due to corrosion of brush holders and springs is not uncommon. Such action, of course, voids the generating ability of the equipment and a dead battery soon results. Quite a number of cases where pole shoes have rusted to armature faces have been revealed where vehicles have stood in the open between campaigns. Starter corrosion problems are similar to generator headaches. Flexible metal conduit often corrodes, cuts the wire insulation and shorts the mechanism. Switches of all types are major problems and light socket springs are seldom in a workable condition after several months of military service.

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Battery carriers and boxes are subjected to a certain amount of action from spilled sulfuric acid and the deposits on battery terminals is an old story even to the civilian motorist.

The second most susceptible component is, perhaps, the brake system. This is understandable by the very nature of the service to which the mechanism is exposed. Splashing salt water into interior brake parts from pools left when the tide recedes is common on beach patrol, nor is it uncommon to the civilian when driving on salted ice areas in winter. In addition, mud and dirt work into the interior and abrade protective films. Ferrous hydraulic cylinder caps freeze to cylinders and steel hydraulic fluid tubing rusts out. Brake return springs break or lose tension as a result of corrosion. Corrosive action from inferior brake fluid has resulted in some master cylinders becoming so deeply pitted that rubber pressure cups were abraded to a point of leakage.

The exhaust systems have caused no end of trouble and results in quite a serious spare parts problem. The problem in providing any corrosion proofing on these parts is complicated by their high temperature of operation.

The fuel system parts deserve consideration and in applying any corrosion proofing to these systems it is essential to always investigate the effect on the gasoline. For instance, will the treatment affect gum formation? Due consideration must be given to the types of fuel that will be used, whether high octane, aromatics, alcohol-gasoline mixtures, etc.

Fuel System Parts

The deterioration of fuel system parts may be on either the exterior or interior. Gasoline tanks are a natural for the entrapment of water due to the breathing phenomena and this action is not limited to military vehicles. The handling of gasoline in small containers in forward areas contributes to the presence of water in the gasoline. The water provides a corrosive media and soon fuel tank interior coatings have disappeared

and flakes of rust are present to clog fuel filters and possibly carburetor jets. In addition, improperly protected diecastings in fuel pumps and carburetors are attacked to a point of almost total disintegration. Steel fuel lines rust on the inside in the presence of entrapped water and on the outside from spray. See figs. 1 and 2. Finally, sluggish acceleration has often been traced to a sticking pump piston as a result of rusting in the cast-iron carburetor.

Hulls and bodies cause considerable trouble. While ordinarily these components do not result in deadlining vehicles, the psychological effect is a very real problem. Particular emphasis must be placed on disastrous use of such things as textiles and felt next to metal. Such cellulosic or wool-like materials absorb moisture and hold it in contact with the metal with a resulting serious corrosion problem. Ordinarily the metal parts above 1/16 in. thick are not much of a problem since the very fact they are of such thickness means long resistance to corrosive attack before failure, but those under 1/16 in. disappear rapidly in many cases.

Tracks and suspensions have caused no end of complicated maintenance because the parts have frozen together. Obviously, tracks and suspension parts are subjected to the worst possible conditions in that they are expected to function in sea water, mud, dirt, sand and all possible conditions of military use.

Ordinarily the power train, the engine, clutches, propeller shafts, differentials, do not present a problem, however. These parts do corrode when the vehicles are kept in storage, which would not happen had the vehicle been kept running or been protected by corrosion proofed design. It is possible that the designs of the future will use protective means now available to avoid such action.

There are a number of miscellaneous parts which have caused problems and the chief offender has been the 70-30 copper-zinc alloys when used in radiator cores. Vehicles subjected to salt air conditions have rapidly developed leaks due to corrosion of the rear radiator areas. Linkages and controls such as brake, throttle and clutch often freeze at bearing areas and pose quite a problem. Springs of all types are particularly susceptible to corrosion, breaking and losing tension. This is especially true when in a stressed condition. Identification plates unless well protected are unreadable after a few months in the open. There are many other minor corrosion problems but the above

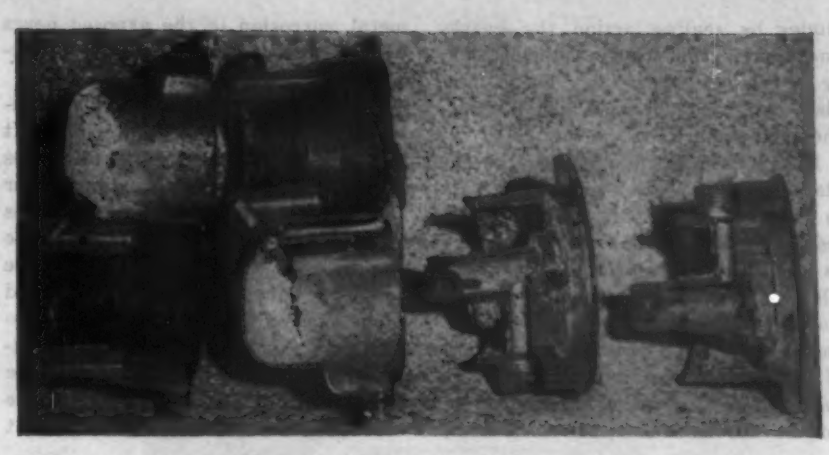


FIG. 1—An untreated die cast carburetor and fuel pump cut in half, showing how completely one of the jets is cemented in and how the ports are plugged with corrosion products.

gives a good idea as to where deficiencies exist in most vehicles.

The designer must consider mechanical relationships when he wishes to corrosion-proof a component part of the vehicle. For instance, what will be the effects on the dimensions of the part and how will that protected part function with relation to other parts and assemblies. In particular, he must remember that different metals in a corrosion medium constitute an electrolytic cell which presents the worst possible conditions.

Another factor that the designer must remember is what materials he has to deal with when considering corrosion-proofing. Basically, they are noncorrodible materials and protected materials.

Generally speaking, the term "noncorrodible" is a misnomer. Even gold and platinum will corrode under certain conditions. Generally speaking, however, purer metals have less tendency to corrode since no electrolytic cells can be set up from point to point because of impurities. In addition, the so-called noncorrodible materials such as stainless steel can be made even more so by treatments which passivate the surface and thus reduce the potential by formation of uniform chemical films. Noncorrodible materials of construction are ordinarily the most permanent method of corrosion proofing. They are easy to apply since the mechanical relationships of a noncorrodible and a corrodible part may be made exactly the same and there is no size or dimensional change involved.

Protected materials for their permanent corrosion protection depend on finishes. The action is either that of an envelope in which the coating ex-

FIG. 2—Corrosion occurring in carburetor exposed to spray.

cludes by sealing action the gasses and liquids that cause deterioration, or it is electrochemical. There may also be a combination of sealing-chemical protection.

Electrochemical finishes may be explained as follows: When two metals in the emf series are involved, the metal higher in the series will act as an anode and protect the metal which is beneath it in the series. The more noble metal acts as the cathode and is protected by sacrificial solution of the more active metal. If a metal such as iron is zinc-coated the protection to the iron is by two methods, the envelope method, as indicated above, and the electrochemical. If the zinc coating is discontinuous or porous, it will electrochemically protect the exposed iron pores by causing them to be made cathodic. The influence of the zinc coating may be sufficient to protect an exposed iron section ¼ in. wide.

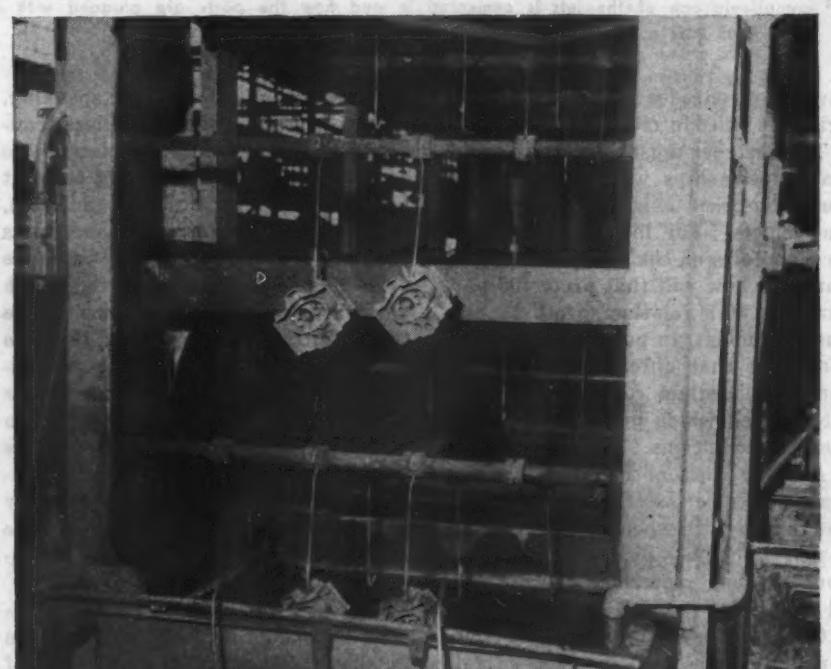


FIG. 3—Dichromate dipping protects zinc-base die cast carburetor parts from corrosion. Photo courtesy Bendix Products Div., South Bend, Ind.

Types of Coatings

The principal types of protective finishes are as follows: electrodeposited, chemical, organic, ceramic, hot dip galvanize and lead-tin alloy, Sherardizing, metal spraying and Calorizing.

In the electrodeposited protective finish the galvanic type of protection is desirable when considering the corrosion protection of metals and alloys. Most commercial electroplate is somewhat porous and unless anodic to base metal, corrosion in the exposed pores will be accelerated and results in pitting.

Cadmium is one of the most universally used plating materials. It has excellent adherence to all types of metals, very good throwing power and can be used on bearing surfaces for its lubricating properties. The quantities of the metal available are not large and should only be used when zinc or lead will not be satisfactory. Oxide treatments on cadmium plate are to be avoided since they accelerate the breakdown of the coating. On jobs especially difficult to plate, cadmium is preferred because its high throwing power enables the more complete plating of recesses, undercuts, etc. Cadmium is often used to prevent scoring during the run-in period of such parts as piston, rings, liners, pump shafts, etc. Ordinarily 0.0001 in. flash is sufficient for such applications and, in addition, provides some protection of parts in storage. Where soldering after plating is necessary, cadmium is particularly applicable. Dichromate treatments are sometimes used on cadmium plate to prevent formation of oxides and possibly prolong life at the expense of increased electrical resistance. On bolts and nuts dichromating increases the thread friction and often results in squeaky assembly.

The use of dichromate auxiliary coatings on zinc is essential except where surface film electrical resistance is important. The dip processes do not produce heat-stable coatings and do not provide as good a paint base as anodic chromate treatments. If anodic coating is desired, it must be so noted on the drawings. If spot welding on dichromate treated parts is necessary, not over 0.0002 in. zinc coating should be specified. Zinc plated electrical parts have about the same contact resistance as steel and with a dichromate treatment, about ten times as much. Zinc plating followed by a dichromate dip or other stabilizing procedure (fig. 3) has a minimum formation of the white zinc corrosion products on the surface of the plated parts. This is especially important in close fitting parts (threads). These treatments have little, if any, effect on dimensions. Cadmium and zinc protect by electrochemical action and, consequently, the continuity of plate is not so important as in lead coatings. The use of zinc on such applications as salt water immersion and in alkaline conditions is not advisable. The same problems of friction in close fits is present with treated zinc as with cadmium.

Lead is an important electroplate metal used for corrosion proofing. The protection provided is due to the inertness of the coating. The plating efficiency of the fluoroborate and sulphonic acid baths from which it is deposited is high and provides a cheap coating with a minimum of codeposited hydrogen. Lead plating is also used where some lubricating qualities are desired along with corrosion protection as in gaskets. The acid conditions prevalent around storage battery connections call for inert materials and lead is ideal. Where smooth surfaces are required, lead may be used since it builds up well and wipes nicely.

Nickel is used where a combination of wear resistance and corrosion resistance is desired. Normally where thin (under 0.002 in.) coatings are concerned, a flash of copper should be applied to the base material. Nickel is used where very good electrical conductivity is necessary. Among the minor plating materials for wear resistance and salvage, nickel is used where large amounts of buildup are necessary or wear resistance must be maintained in the presence of acids. In addition, its ability to be scraped to a bearing surface and the excellent adhesion are important. Nickel is wetted easily by oil and is more machinable than chromium. Black nickel, a special type of nickelplate,

is used where non-glare properties are necessary.

Chromium on parts such as gages, dies, and bearings is used to great advantage as a wear-resistant metal. Service chrome has proved so successful from a wear resistance standpoint where parts have been salvaged by this method that provisions are now being made on new designs that will facilitate plating. Chrome plating is of little value from a wear resistance standpoint unless the base material is in a hardened condition. In general, plating should be resorted to only where special conditions exist such as parts that are to be intermittently built up with electroplate in service to compensate for wear. (Example: plug gages.) Hard chrome as such is difficult to lubricate, and should only be used where parts are running in oil or pressure lubrication is provided. Where splash lubrication or boundary lubrication conditions are found, porous chrome should be used since oil is held in the coating itself. Channel chrome is a special type of porous chrome plating which has directional properties and is especially applicable to cylinder bores. The use of chrome for decorative purposes is well known and will not be treated in this article.

Tin may be used for protection where the toxic effect of other metals must be considered. The antifriction qualities of tinplate are well known and, consequently, flashes of tinplate are used as a break-in coating for bearings and other rubbing surfaces such as pistons and rings. It is also used on electrical parts for conductivity purposes. The uses of tinplate as a lubricant for press fits, as a stop-off for nitriding, and as a sealant are important.

Copper is used for wear resistance in some cases where hand-fitted parts are scraped to size. Copper is generally used as a base for other types of plating and assures a more uniform coating of other metals such as lead. Seldom is use made of copper for corrosion proofing.

Silver is used in a manner similar to cadmium and tin for prevention of scoring. It is also used for reflectors and where excellent electrical conductivity is desired. The use of silver as a basic bearing plating material in thickness from 0.002 in. to 0.030 in. is common. In high-speed and load applications a 0.0015 in. layer of lead is usually placed on the silver for "break in" and lubricating qualities. A flash of indium is applied to the lead to produce a bearing structure and prevent corrosion of the lead.

Alloy plating such as lead-tin is being used where corrosion resistance plus ability to solder plated parts is concerned. Lead-iridium has been used as a bearing metal in thicknesses up to 0.020 in.

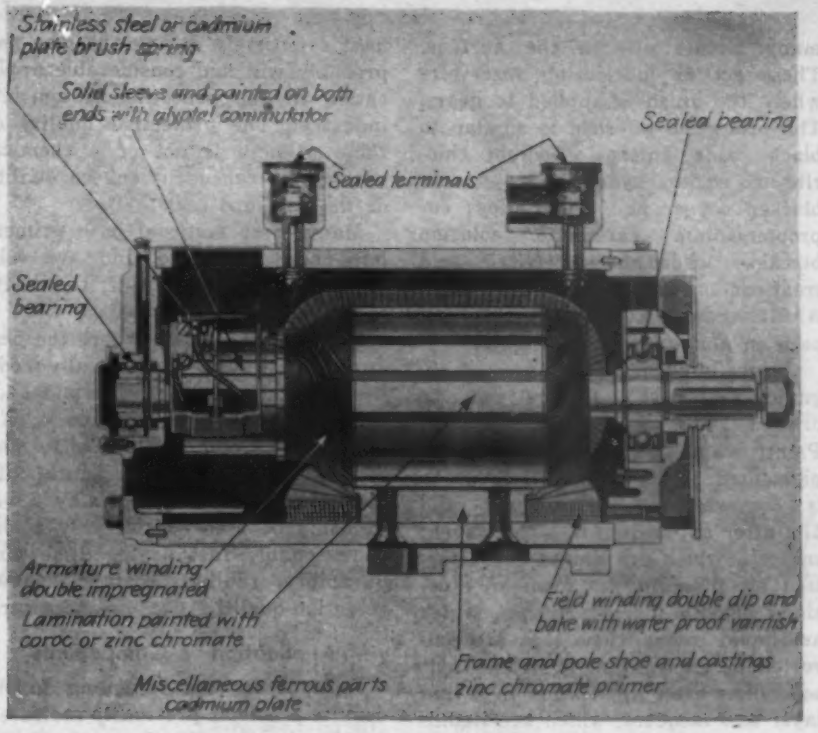

Stainless steel or cadmium plate brush spring
Solid sleeve and painted on both ends with glyptal commutator
Sealed bearing
Sealed terminals
Sealed bearing
Armature winding double impregnated
Lamination painted with coroc or zinc chromate
Field winding double dip and bake with water proof varnish
Frame and pole shoe and castings zinc chromate primer
Miscellaneous ferrous parts cadmium plate

FIG. 4—Water and corrosion-proofed generator. Note use of plating organic coating and noncorrodible materials of construction. Photo courtesy Delco Remy Division.

While it should be stated that any part may be plated if sufficient importance is attached to such a coating, the designer can help the plater considerably if in his design he considers a few basic principles, such as avoiding sharp corners and deep recesses. Deep recesses do not plate except by costly methods and chipping starts at sharp corners.

Chemical Treatments

The chemical treatments that are of the most importance are the phosphate and oxide types, among which are Parkerizing, Ircoizing, Bonderizing, Pentrate, Ebenol, Parco-Lubrite, Deoxidine, etc.

FIG. 5—Method of protecting dimmer switch from water and corrosion by chemical treatment of die cast part, sealing and plating. Photo courtesy Delco Remy Division.

Oxide black finishes should be used with caution. Generally they are essentially magnetic iron oxide which easily breaks down to the iron oxide commonly associated with rust. From a protective finish standpoint they are about as good as the finishing material applied to them is over untreated steel, i.e., (finished with nondrying petroleum oils, rust inhibiting lacquer and synthetic resin coatings). These coatings do form better bases for paint than bare metal and may be used for such purposes but phosphate coatings are much preferred. The finishes are usually applied from hot (280° to 300° F) water solution of mixture including caustic soda, sodium nitrate and nitrite with potassium permanganate an dichromate occasionally used. Oxide finishes applicable to most stainless steels by immersion in an aqueous solution of chromate salt at not over 200° F are used for prevention of glare and as a paint base. Oxide finishes applied by immersion in fused dichromate salts at about 800° F and are used for chromium stainless steel parts.

In addition, there are a number of other chemical coatings such as Surfiding, which is produced by a sodium hydroxide-sulphur solution and which is in effect a strong sodium polysulfide treatment. The action of the solution produces a dark sulphide film with

many minute pits in the surface. These act as lubricating reservoirs where the finish is applied to gears. The protection afforded is similar to black oxide finishes. Sodium chlorite and sodium hydroxide treatments blacken copper and brass alloy; cuproammonium carbonate solution blackens leaded brass. Nitric acid treatments passivate stainless steel. Anodizing and Alrok treatments are used on aluminum and its alloys.

Generally speaking, the field of organic protective coatings can be divided into four classifications: Paint, which may be defined as a pigmented liquid composition which is converted to an opaque solid film after application in a thin layer; enamels, which are paints characterized by an ability to form an especially smooth film; varnishes, which are liquid compositions that are converted to transparent or translucent solid films after application in a thin layer and lacquers, which are liquids containing cellulose esters or ethers as the basic film formers and are characterized by fast drying due to solvent evaporation.

It is extremely important that the surfaces to which organic coatings are applied be free of dirt and oxides. The surfaces should be of such a texture as to present a very large area for mechanical adhesion of the coating and, finally, corrosion inhibiting ions such as hexavalent chromium are necessary for maximum protection.

After the metal surfaces have been properly prepared the coating system can be applied. In this connection a rule of thumb that was used in some cases during the war was that all sheet steel thinner than 10 gage and other ferrous parts ¼ in. or thinner where exposed to extreme corrosive conditions, phosphate treatment would be used before applying organic coatings. Depending on the amount of protection desired one to three prime coats and finish coats were then indicated.

The zinc chromate primers are probably the only primers which might be called general purpose primers and unless applied too heavily give excellent corrosion proofing on most metals. Coatings of these primers over 0.0005 in. tend to chip and peel. Where more durability with thicker coatings, or where several costs of primer are applied, the lead base chromate paints are most suitable.

The lead oxide base primers have excellent corrosion resisting qualities but the health considerations often bar their use.

Iron oxide base primers have been used extensively during the war and probably will find considerable application in the peacetime automobile industry. The protective quality of these primers is not of a chemical nature but dependent on the quality of the envelope seal.

Many inert material base primers have been developed and are very satisfactory especially if the parts have been properly prepared.

Final organic coats where the best durability is desired are usually modified melamine or urea-formaldehyde products, and where abrasion is particularly a factor, the phenol-formaldehyde type are very helpful. In this connection the 40 pct alkyds will probably be used considerably where a reasonably fast drying time plus durability, fading resistance, luster retention qualities, etc., are necessary.

Application to Components

In applying the foregoing to the definite problems previously indicated, use has been made of practically all types of corrosion proofing. No one coating or material has universal application and the many approaches used in corrosion proofing motor vehicles parts during the war bears this out. Typical examples of methods employed are as follows.

Considerable stress has been placed on the sealing of electrical equipment. Generator and starter motor brush springs are now stainless steel or cadmium plated depending on the protection desired. Miscellaneous ferrous parts are cadmium plated, water and corrosion-resistant organic coatings are applied to seriously affected parts and the use of sealed components is resorted to wherever possible. Examples of corrosion-proofed electrical parts are shown in figs. 4 and 5. In each case very definite specifications for composition, thickness and continuity of protective coatings are shown on the prints.

The elimination of metalic caps on hydraulic brake cylinders gives definite improvement in brake performance under corrosive conditions. The change to rubber bellows types provides a seal that keeps the corrosive media from the bearing surfaces. The use of noncorrodible bushings plus more clearance in bearing areas is helpful. Chemical coatings with organic top coats helps on springs and the application of good paint systems to other nonfunctioning parts has resulted in much less deterioration.

Exhaust systems using stainless steels have resulted in many less spare parts being shipped for combat vehicles. On motor transport the simple expedient of increasing gage thickness and adding drains have materially increased muffler life. Ceramic coatings hold promise but the problem to date has been to get adequate coverage.

Zinc and aluminum-base diecastings on fuel system parts are made much more greatly corrosion resistant by dichromate chemical treatments and a newly developed thiokol product seems to be the answer to rusted interior of gasoline tanks. Phosphate coatings plus good paint systems on the ferrous parts provide improvement. Hot-dip, lead-tin alloys applied to steel fuel lines have improved the quality of those parts.

The hull and body sheet metal can be made much more resistant to deterioration by proper cleaning and chemical treatments, preferably phosphate, before applying adequately specified organic coatings. In addition asphaltum coatings have been applied in the field to fender undersides and battery hangars with excellent results. It appears that some thought should be given in new production to this approach. Finally, the use of thin-film rust preventive over dry painted surfaces has been very helpful.

The use of wear resistant, corrosion-resistant types of electroplate on suspension bearing parts has lowered considerably the maintenance load due primarily to "freezing." This also applies to linkages and controls.

Phosphate coatings on gears provide dual features, namely, good break-in characteristics and corrosion-resistant properties.

Copper-zinc (85-15) alloys for radiator parts compared to 70-30 copper-zinc in the same geographical areas show much lower replacement figures.

Springs in general pose a unique problem. Rust prevention may be obtained by either electroplating or by a phosphate coating plus paint. Hydrogen brittlement must be avoided to obtain maximum service life. Springs should not be acid dipped after final treatment prior to plating or phosphate coating, but should be cleaned by sand tumbling or shot peening. The cold working resulting from shot peening has definite beneficial effects in reducing fatigue failures. After electroplating, springs should be baked to remove occluded hydrogen for a minimum of 3 hr at 400° to 425° F. Recommended electrodeposited coatings for springs are, in the order of preference, cadmium, lead and zinc. Cadmium and lead both exhibit high plating efficiencies

(CONTINUED ON PAGE 176B)

Acid Electric Furnace Carbon Control

. . . The practical aspects of carbon control, the various types of equipment and procedures that can be used, and other factors leading to consistent quality heats are described by the author herein.

By CHARLES LOCKE

Chief Metallurgist, West Michigan Steel Foundry Co., Muskegon, Mich.

WHY control the carbon content of the steel bath is a question that borders on facetiousness; yet the answers are so often obscured by the obvious and pervading one, that the chemical analysis stipulated by the customer must be provided.

Without even attempting to meet a chemical specification, it would be advantageous to control the carbon if quality steel is desired. It is not news to the practical melter that the very essential reaction known as the carbon boil can only be controlled by the correct manipulation of carbon content along with iron oxide content and bath temperature. Knowledge of the carbon content and the ability to control it in its relation to the boil can prove to be priceless.

Another approach, which too few operators understand, is the use of carbon control to aid in the determination and manipulation of the percent FeO in the bath. To date, the greatest strides have been made along this line by the openhearth men.

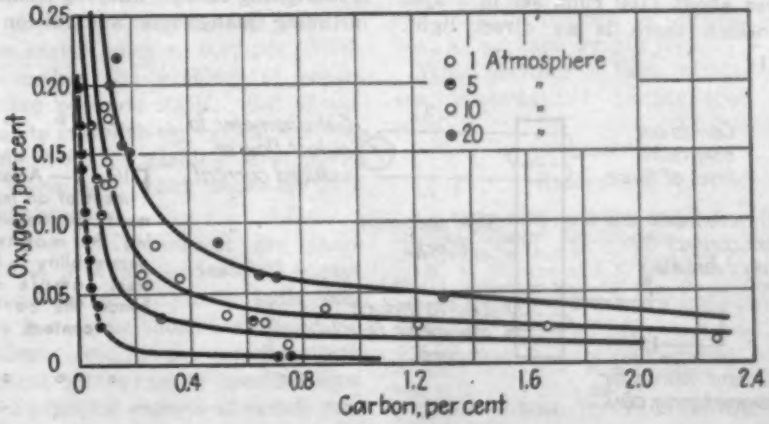
Considering the FeO-carbon relationship in molten steel from the standpoint of theoretical chemistry alone, it is at once noticed, as shown in fig. 1[1], that the increase of one must mean the decrease of the other. From this relationship and through the statistical study of many heats[2], there have been established charts from which the FeO content of the metal is known by its correlation with the percent carbon of the bath. This information is so important to the rolling mills that thousands of dollars have been spent in building and using apparatus for the determination of FeO content. But with the correct interpretation, the control of carbon can aid in securing that knowledge. Reams have been written about this fascinating subject, but the point of the present argument is that the melter is controlling FeO when carbon control is exercised, whether he knows it or not, and whether he wants to or not.

However, whatever the aims are in controlling carbon, a program for its control should be and can be established to suit the particular type of steel being melted. It is always agreed that the first place to start is with the raw materials. An accurate check of carbon content on scrap, ferroalloys, and pig iron can through a knowledge of furnace losses act as the only carbon control needed. Every melter knows that if the furnace behaves itself, he can run heat after heat almost by the clock when the scrap is identical. This is carbon control, to be sure, in its simplest form.

But seldom does such a Utopia present itself; hence, many methods have been devised to enable the operator to secure the carbon content of the bath. Perhaps it would not be amiss to briefly review those methods that have proven successful.

Whatever one is mentioned, it must of course be correlated with chemical analysis. In many plants, chemical analysis is still used exclusively and many would not be able to recognize the old-timer, since a number of improvements have been made. The thimble test for securing the sample gives a rapid method for providing a specimen that can be easily powdered. Thus, lost time in drilling is overcome. By using chainomatic magnetically dampened balances, the previously slow and tedious weighing is hastened. Then, the high temperature 2100°F, now employed in combustion furnaces, cuts down the oxidation time, while the volumetric determination of the

FIG. 1—The FeO-carbon relationship in molten steel from the standpoint of theoretical chemistry.



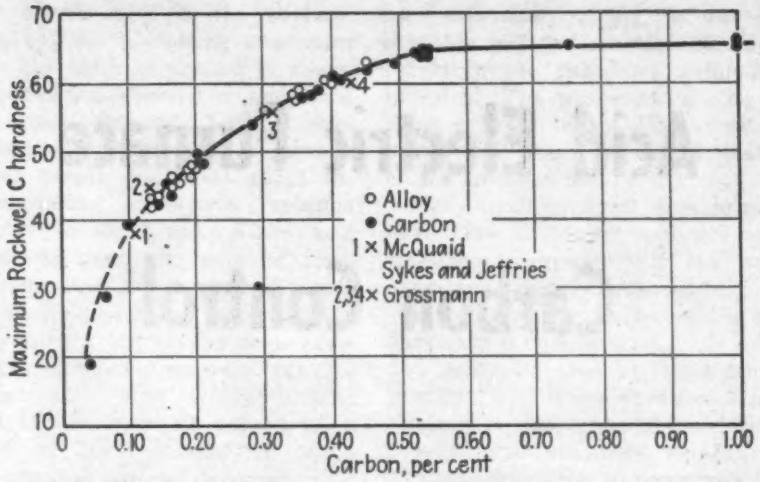


FIG. 2—Statistical study of many heats gives this correlation of FeO content with the percent carbon of the bath.

CO_2 formed instead of the gravimetric has also decreased the time consumed. In several plants, such a procedure is employed right on the melting floor, since the accuracy of the chemical determination along with the newly acquired rapidity is very satisfactory for the preliminary and the carbon can be, if necessary, positively known before pouring.

Having had a minimum of experience with fracture reading for determining carbon, the writer hesitates to make too many statements that will be read by those who have proved its worth. When its limitations are recognized, it is an excellent guide as to when the base iron upon which to build the heat is at hand. If for no other reason at all, the fracture test, since it requires a low residual silicon for correct interpretation, can act as a beneficial force on the melter. The low silicon, a good indication of the proper degree of oxidation so often neglected, will be obtained as a secondary result of the melter's desire to know the carbon of the heat.

Another method, which like the fracture test, depends on the skill of an interpreter, is spark testing. The equipment is simple, consisting of an appropriate grinding wheel that revolves about 1750 rpm, set in a spot on which there is no direct light. With the silicon and manganese kept below 0.14 pct, the type of spark burst given off by a quenched sample as it is held against the wheel with an even pressure is indicative of the carbon content. With a set of known standards as a guide, this method, it is reported, will give an accuracy of ±0.02 pct C below 0.22 pct C and ±0.05 pct above 0.22 pct C.

It should be noted that with both fracture reading and spark testing it is customary to fortify the reading by occasional chemical checks.

A new method for determining and controlling carbon during melting which arouses a great deal of interest and will prove of great value, if some obvious hindrances are conquered, is the use of hardness values.[3, 4] It has been well known for a number of years that the maximum hardness obtainable in steel is mainly dependent on its carbon content. A graphical representation is shown in fig. 2[3]. It is therefore feasible to correlate carbon content with hardness if a technique can be devised whereby the maximum hardness can be obtained. There have been procedures reported by several investigators, but attempts to use them have, in most cases, met with indifferent success. It is intriguing because alloying elements including manganese and silicon do not interfere; in fact, they aid in obtaining the maximum hardness. This also means that the carbon of a finished heat can be obtained in the matter of 3 min, including the taking of the test. Equipment, such as a Rockwell hardness tester, not too expensive, must however be purchased.

There are other physical properties of steel that could be used as criteria for determining carbon. Of the many that have been tried, notable results have been achieved in using the magnetic properties.

Five commonly measured magnetic properties are known to vary with the percentage of carbon[5], to some degree at least, in steel. These are saturation, permeability, coercive force, remanence, and hysteresis loss. Instruments depending on the coercive force and saturation have been built and operated to a limited degree. The greatest success has been attained with apparatus employing circuits to utilize permeability. The Carbometer[7], the Leitz-Blosjo Carbonmeter[8], and the Fisher Carbonalyzer[9], are of this type.

Schematically, an instrument for determining the magnetic permeability of a steel sample, and hence its carbon content, can be represented by fig. 3[10]. The circuit is maintained so that the following are constants: (1) Energizing current, (2) size of energizing coil, (3) size and shape of core, and (4) size of energized coil.

A measured deflection of the galvanometer will then depend on the variable of the system, namely, the composition of the core.

These magnetic instruments must be calibrated with a series of known samples. Once the curve is established, further chemical work is unnecessary, but various curves must be set up for steels of different analysis with reference to alloys.

With everyone of the methods mentioned, the deviation from a strict routine must be held to a minimum. In addition, none of the methods themselves can control the carbon; that is up to the melter who has a better chance, if he is able to follow the change in carbon by some established scheme, whether it be a fancy machine or it be a count of the bubbles during the boil.

To be certain that the following remarks will not be misleading, some quantitative boundaries should be placed on the terms low, medium and high. It is well realized that in one shop a 0.45 pct carbon can be considered high, while in another it would be in a medium range. The classification of the Steel Founder's

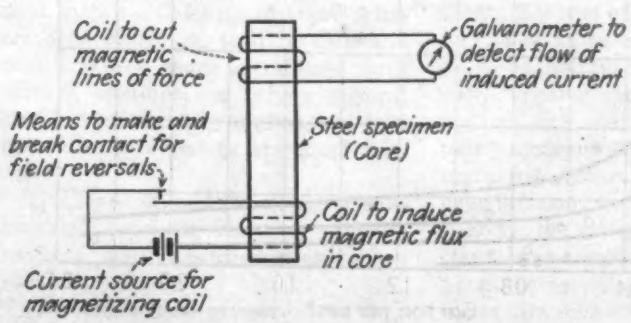

Coil to cut magnetic lines of force
Galvanometer to detect flow of induced current
Means to make and break contact for field reversals
Steel specimen (Core)
Coil to induce magnetic flux in core
Current source for magnetizing coil

FIG. 3—Arrangement of an instrument for determining the magnetic permeability of a steel sample and hence the carbon content.

Society is therefore submitted to give a mutual understanding during the dicussion. In their handbook, a low-carbon steel is one containing less than 0.20 pct C; a medium-carbon steel, between 0.20 and 0.50 pct; a high-carbon steel, above 0.50 pct.

It has often been a point of contention among acid electric melters that the difficult steel to produce is either the very low (under 0.10 pct) or the very high (about 0.75 pct). With the low, deoxidation troubles are encountered; and with the high, the carbon just cannot be raised. Apparently the in-between carbon range is obtained as easily as falling off a log.

Since in all cases the crux of the carbon control is the manipulation of the bath to govern the chemical reactions:

$$C + FeO = CO + Fe$$
$$2C + SiO_2 = 2CO + Si$$

their examination from a chemical thermodynamic standpoint yields some insight into the problem. Granting the importance of the theoretical aspects of the equations by, at least, mentioning them, it is preferred to continue with the practical methods of making them function to the melter's advantage.

If quality steel could be obtained by dead melting, carbon control, of course, would be rather simple. However, the necessary boil, as long as it is to be provided by CO derived from the carbon of the bath, complicates the situation.

Firstly, enough carbon must be available to permit the boil to start. The very often neglected check on the carbon prior to the boil should be a strict must in the melting routine. If necessary, the adjustment can therefore be made before the reaction proceeds at its greatest rate.

Naturally when there is a continuity of similar analysis to be made and there is a uniform charge, this meltdown carbon can be provided if necessary by a predetermined amount of carburizer. Pig iron, broken electrode pieces, petroleum coke, flake graphite, breeze, coal, carburite, or high-carbon steel—all can be utilized. When a melt is obtained, carbon is also commonly added by dipping the electrodes.

With the boil in process, another carbon check can well be taken just after its most vigorous action. In many cases, this action reduces the FeO content towards its carbon equilibrium value and the silicon reduction equation gains prominence to the detriment of the hydrogen cleansing intended to be gained by the boil. Hence, this check is doubly important.

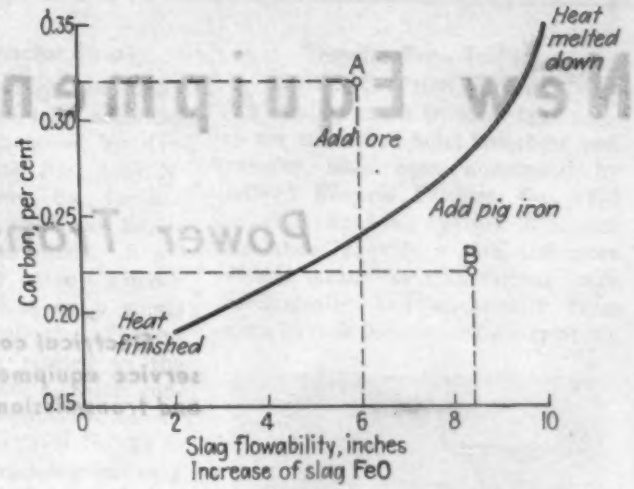


FIG. 4 — Relationship between the bath carbon and slag composition which, if maintained, will produce the best steel with a given practice.

Next, a carbon check should be taken at the end of the boil, or at that stage the heat is ready to be blocked.

The actual carbon content at this point is not the most important item. The important thing is that a vigorous boil be maintained. The carbon drop or rate of carbon drop will indicate whether or not this requirement has been carried out. For example, one shop may melt down at 0.35 pct and at the end of the boiling period show a carbon content of 0.15 pct in the bath. Another shop may melt down at 0.20 pct and after boiling show a bath carbon content of 0.10 pct. Both heats have maintained an adequate boil for the complete oxidation process, since as the carbon content of the bath reduces, the length of the boil is increased in order to oxidize additional carbon.

Thus, with many heats, through the proper maintenance of the carbon level, no recarburization, except that obtained from the ferroalloys, is necessary after the boil. Melting in with 0.35 pct carbon or adjusting it to that is adequate for tapping at 0.25 pct and melting in at 0.60 pct has proven suitable for finishing at 0.45 pct C.

It is known that such a method will meet with disapproval by those who advocate always boiling down to a low carbon such as 0.12 pct. With this method the problem of recarburizing presents itself. But if the means to establish the carbon anytime during the steel making is at hand, recarburizing is not necessary for quality steel.

Of particular interest are those practices in which a base steel is tapped and carburized in the ladle. Reports from some shops have indicated excellent results in meeting both chemical and physical specifications.

The practical aspects of carbon control cannot be dismissed without reference to its correlation with slag control. Slag control routines have been reported in detail in the literature [11, 12, 13]. Whichever method is employed — pancake tests, viscosity, specific gravity, etc. — the criteria established can be used as a working guide in controlling the heat of the steel. As in a number of plants, the slag viscosity although an indication of the chemistry of slag is reported on the melting floor as inches.

Through a constant knowledge of the bath carbon content and the slag iron-oxide content an empirical melting curve can eventually be derived. The curve will represent that relationship between the bath carbon and slag composition which, if maintained, will produce the best steel with a given practice.

To illustrate, such a curve is shown in fig. 4 for a plain-carbon heat to finish at 0.25 pct C. If a simultaneous carbon and slag check give results that intersect at a point to the left of the curve as at A, the melter realizes that the slag condition must be changed in order to move over to the curve for that carbon level; hence, ore is added. When the carbon and slag check places the point to the right of the curve as at B, the curve can only be reached by adding carbon, as perhaps by pig iron.

When melting is thus, within reason, systematized, quality steel results.

References

[1] S. Marshall and J. Chipman, "The Carbon-Oxygen Equilibrium in Liquid Iron," Trans. A.S.M., v. 30, 1942, pp. 695.

[2] K. L. Fetters and J. Chipman, "Slag-Metal Relationships in the Basic Open-hearth Furnace," Trans. A.I.M.E., v. 140, 1940, pp. 170.

[3] R. O. Kern, "Rapid Carbon Determination at Furnace of Remelted Alloy Steels," *American Foundryman*, September 1942, v. 4 (3), pp. 8.

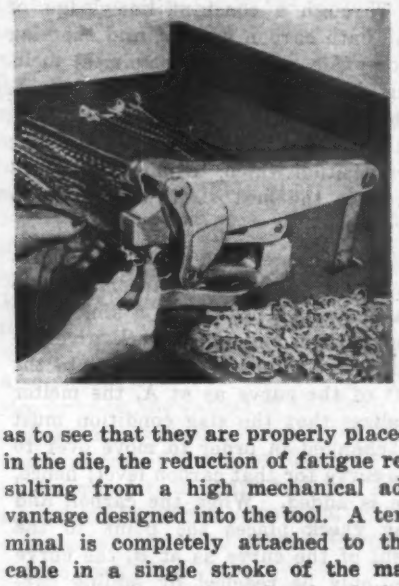
(CONCLUDED ON PAGE 176B)

New Equipment...

Power Transmission

... Electrical contactors, relays, connectors, rectifiers, motors, and service equipment, as well as hydraulic pumps, power packages, and transmissions are described and illustrated in this week's issue.

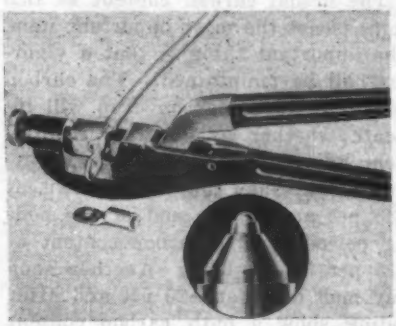
A FOOT-OPERATED Hytool has been announced by *Burndy Engineering Co., Inc.*, New York 54, for installing hydent on electrical wire and cable, sizes No. 22 to 10 inclusive. It is said that this Hytool, No. Y10R, fills a gap between power-operated tools normally used for large volume production and hand-operated pliers generally used for electrical maintenance and repair work. Wide jaw opening and front feed which make it easy for the operator to insert the cable and connector as well



as to see that they are properly placed in the die, the reduction of fatigue resulting from a high mechanical advantage designed into the tool. A terminal is completely attached to the cable in a single stroke of the machine, during which the insulation grips are closed and the terminal barrel is indented onto the cable. Each set of dies takes three connector sizes.

Hand Tool

A BROAD range hand tool for indenting electrical connectors has been announced by *Burndy Engineering Co.*, 107 Bruckner Blvd., N. Y. 54. A feature of the tool which facilitates the making of correct indentations on the barrels of the various sizes of connector is the combination of a stepped impression die and an adjustable holding die. When set for small sizes of connectors, the indent is formed only by the small diam portion of the die. When set for larger



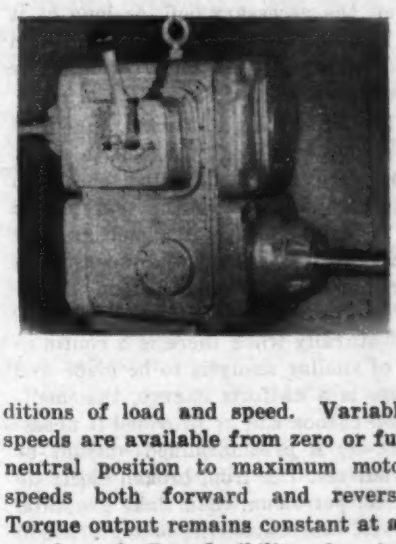
connectors, the large portion of the impression die is brought into play and the stepped design provides for the proper flow of metal in the connector.

Portable AC Test Set

A PORTABLE, self-contained, 100-000 v ac test set for the testing of heavy apparatus which cannot readily be moved to a stationary test berth or laboratory has been announced by *General Electric Co.*, Schenectady 5. The unit, with a capacity of 10 kva, is suitable for conducting tests on large high voltage equipment such as motors, generators, circuit breakers, bushings, short lengths of cable and other electrical apparatus. The complete equipment consists of an oil immersed step-up transformer, hand-operated induction regulator for smooth voltage control, double-scale output voltmeter, electric timing clock, overload relay with automatic reset and a two pole magnetic contactor. Safety devices include a safety foot switch which de-energizes the set when it is released and a screen guard located between the high-voltage bushing and the operator's working position. The test set can be plugged into any 230 v, 60 cycle outlet.

Hydraulic Speed Transmission

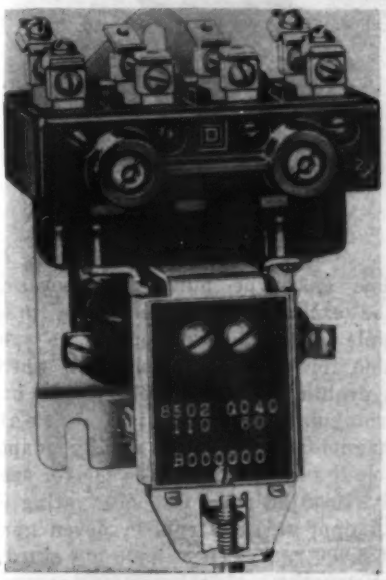
THE Portman model HT-1 hydraulic variable speed transmission has been announced by the *Portman Machine Tool Co.*, 70 Portman Rd., New Rochelle, N. Y. It is said to be of the heavy duty type and is intended for use as a variable speed drive unit for all kinds of industrial applications calling for continuous duty performance under varying con-



ditions of load and speed. Variable speeds are available from zero or full neutral position to maximum motor speeds both forward and reverse. Torque output remains constant at all speeds, and offers flexibility of control under all operating conditions. Various types of control mechanisms in addition to the hand lever shown are available to suit all applications, including remote control stations. This same transmission can also be furnished complete with electric drive motors for various electric current specifications and to include base for the mounting of the hydraulic transmission and the electric motor, starters and other controls suited to the particular application.

Convertible Contactors

CONVERTIBLE contacts, easily changed from normally open to normally closed without additional parts, are a feature of the new size 00 contactors just announced by the *Square D Co.*, 40-41 N. Richards St., Milwaukee 12, Conversion from normally open to normally closed is performed simply by removing a movable contact assembly, inverting it, and putting it back in place. No additional parts are involved. All terminals, in addition to being accessible and conveniently located for individual or group mounting, have provision for two wiring clips. A new-type contact bar and guide is one of several construction details which assure substantially increased life. Double-break silver contacts can be readily replaced if, and when prolonged, frequent operation makes replacement necessary. These contactors are suitable for mounting on steel panels.



Cable Connector

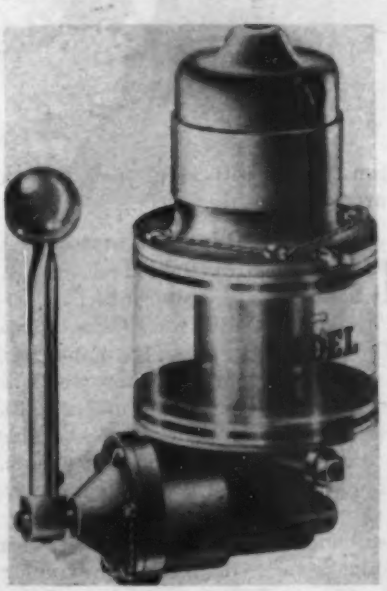
THE cut-away photograph points out the time saving features of the Garibay speed cable connector, just announced by *Yarco Distributors*, 215 W. 7th St., Los Angeles 14, or 120 Wall St., N. Y. 5. It is fully mechanical and a secure cable connection can be had simply and quickly without the need for molten lead or solder. Connection is made by flaring end of cable and inserting into the end of the connector and screwing tight. Insert opposing end of the connector and give one-quarter turn and a secure, dependable connection is made. All parts are precision machined to remain in alinement.

Solderless Connector Strip

A CONNECTOR strip, especially adapted to hangers for sectional wiring has been announced by *Aircraft-Marine Products, Inc.*, 1591 N. Fourth St., Harrisburg, Pa., for use with the company's solderless knife-disconnect splicing terminals. It affords quick assembly of any number of terminal connections on a single block of insulating plastic. The integral members are riveted to the plastic base. Any knife-switch connect end may be specified to accommodate any wire size from No. 22 to 10 inclusive and the opposite end may be made for a different wire size. Ample space is given for easy access to any one connection and the wire is connected by holding it vertically in contact with the strip member and then pulling it back.

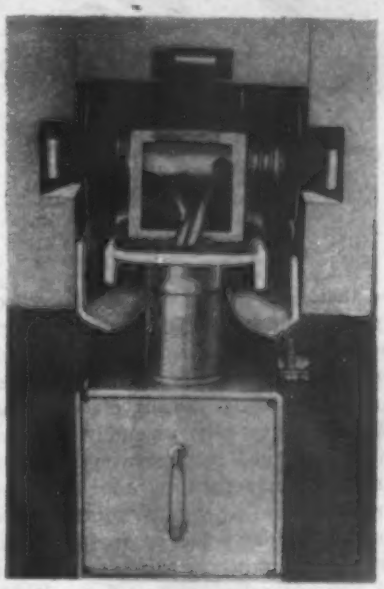
Hydraulic Power Package

ILLUSTRATED is a hydraulic power package which has been announced by *Adel Precision Products Corp.*, Burbank, Calif., to provide a compact, light weight source of power for actuation of landing gear and wing flaps in light airplanes. It is also adaptable to non-aircraft uses requiring an independent or self-contained hydraulic system. Because of its compact design, the power package may be mounted forward of the instrument panel or in any small space convenient to the pilot without interference with other controls. Operation is controlled by a handle. A battery circuit switch may be arranged in a manner to operate independently or so the circuit will be opened and closed automatically when the handle is moved.



Transfer Type Trolley

A MODIFICATION in their duct design and a transfer type trolley for crane and hoist switching and transfer have been announced by *Bulldog Electric Products Co.*, 7610 Jos. Campau Ave., Detroit. It is said that these provide a safe and more efficient means for transferring loads mechanically and electrically from crane bays to individual factory areas.



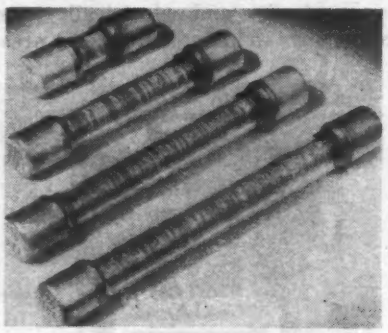
This is accomplished by electrical transfer trolleys with swiveled heads moving through duct runs having flared ends to facilitate juncture with and transfer to similar runs in adjacent factory bays. In these installations straight or curved runs of electrical Trol-E-Ducts are attached to and move with the crane and hoist equipment to furnish a safe, smooth and speedy means of transferring or switching material to or from any part of a factory.

Adapters for Solderless Connectors

ADAPTERS for quick disconnect solderless wiring have been announced by *Aircraft-Marine Products*, 1591 N. Fourth St., Harrisburg, Pa. The preformed adapter member is installed in the assembly in the same manner as the solder tab it replaces. However, it terminates in a knife-disconnect end which accommodates the knife disconnect terminal. Quick connections and disconnections are made by engaging the terminal to the disconnect end by means of a knife switch wiping action. The connected terminal is in perfect 4-point contact and assures maximum electrical and mechanical performance. Adapters for vertical or horizontal conversion for wire sizes from Nos. 22 to 10 are available.

Sealed Rectifiers

HIGH-VOLTAGE selenium rectifier stacks, hermetically sealed in glass, have been announced by *Federal Telephone & Radio Corp.*, 67 Broad St., N. Y. 4. No larger around than a fountain pen and constructed like a cartridge fuse, the stacks may



be installed quickly and easily. Electrical connection is made through heavy silver plated ferrules at each end of the glass tube. These ferrules are of a size to permit mounting in 30 amp fuse clip assembly. Especially designed for operation in high ambient temperatures, the rectifiers are available in several tube lengths and in various voltages up to 4000 v. Incorporating the advantages inherent in Federal selenium rectifiers—lightweight, and long-life and silent, trouble-free operation—these compact units show great promise for application to cathode-ray tubes in postwar television, as well as in high-voltage, low-current rectifiers for a wide range of uses in numerous other electronic devices.

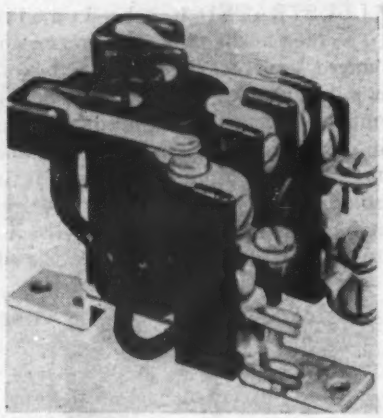
Selenium Rectifiers

AS an addition to their array of industrial electrical equipment, *Radio Receptor Co., Inc.*, 251 W. 19th St., N. Y., has announced a line of selenium rectifiers. Efficiency, stabil-

ity, long life, compactness and an almost total absence of maintenance costs have characterized selenium rectifier performance. These rectifiers have the advantage of enabling efficient operation at high ambient temperatures, of being less susceptible to moisture, more stable, and displaying improved aging characteristics. Units that have been in service for more than a decade give evidence that this type rectifier will serve at least fully as long as other circuit components.

Magnetic Relays

AN improved line of single and two pole ac and dc magnetic relays for industrial and electronic application has been announced by *R-B-M Manufacturing Co.*, Logansport, Indiana. Armatures are self-aligning. All wiring terminals are easily accessible from the front. Single and two pole ac and dc relays have identical bases for complete interchangeability in mounting. Relays may be mounted either from front or rear. All relays in this R-B-M line are available in



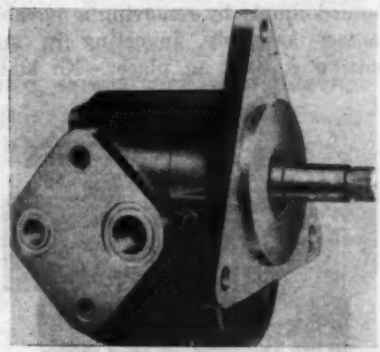
open type or with sheet steel, general purpose enclosure.

Vertical Dripproof Motor

IN addition to their line of protected-type ac motors the *Crocker-Wheeler Div., Joshua Hendy Iron Works*, Ampere, N. J., has announced a vertical dripproof motor which is rated at 40 C rise continuous duty with a 15 pct service factor. This motor is designed for operation from 60 to 50 cycle, 3 or 2 phase circuits at all standard voltages. All ventilating openings of this motor are shielded against the entrance of dripping liquids and falling particles. Oversize ball bearings are provided to carry thrust in addition to the rotor, and the use of centrifugal bearing seal permits the use of softer grease for better lubrication and longer bearing life. A recessed junction box which provides ample room for making electrical connections, is employed in the motor's design. Other features include heavy cast frame construction and coils.

Hydraulic Pump

HIGH volumetric efficiency features the general-purpose hydraulic pump announced by *Pesco Products Co.*, 11610 Euclid Ave., Cleveland 6. Thorough calibrations show volumetric efficiencies of 95 pct and better at 3000 rpm under pressure of 1,500 psi.



The gear-type pump, incorporating the exclusive pressure-loading principle of the aircraft pumps, is suitable for universal application where hydraulic power is utilized. It has triangular mounting pad, or SAE magneto flange, or is readily adaptable to other design mounting for special installations. Capacity rating is 3.5 gpm at 1,500 rpm or seven gpm at 3,000 rpm. The simple but sturdy construction of this pump assures long, trouble-free life. Weight is 4.4 lb.

Iron Core Magnetic Components

A COMPREHENSIVE line of precision-engineered iron ore magnetic components, custom-built to meet specific requirements and incorporating important design innovations, has recently been announced by *Federal Telephone & Radio Corp.*, 67 Broad St., N. Y. 4. These units have been put in quantity production in response to the increased demand for specially designed high-quality iron core transformers and reactors. Available with power ratings ranging from milliwatts to kw, Federal mag-

netic components can be provided in any of the basic types of construction —open, frame, semi-enclosed, enclosed and hermetically sealed.

When the mad rush begins... competition will be terrific.

Wages will stay high—competition will be terrific. To remain in business and maintain full employment, manufacturers must use the most efficient machine tools obtainable. Scrap the old machines and cut production costs.

There's the case of a manufacturer whose purchase of a Jones & Lamson Turret Lathe nets him a saving of $700 to $1000 per month on a single part. That's but one of many similar cases.

Whether you buy War Surplus machines or new machines to replace your obsolete equipment, be sure that they can transmit the horsepower and have the rigidity to use the carbide cutting tools which provide the fastest known method of metal cutting today. Jones & Lamson machines can transmit the horsepower and have the rigidity to take full advantage of these tools. Send for our book, "Welcome to You and Your Problems." Or, better yet, phone now for one of our engineers to assist you in making the most profitable investment.

JONES & LAMSON
MACHINE COMPANY
Springfield, Vermont, U.S.A.

Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

Assembly Line . . .

STANLEY H. BRAMS

• Bold engine designs will power new entries in autodom, and they may spur movement to unorthodox lines of development . . . Hudsons to be in two series.

DETROIT—The automobile industry is typically conservative in its product development; the amounts of money it bets each model year on a new product are so huge that discretion dominates and innovations do not. There is some thinking, now, that the entry of new factors into the automobile industry may jolt autodom's orthodoxy.

Engines are a case in point. More and more they have become alike through the years, and all change has followed parallel lines. Now, however, three new engines are turning up which may exercise important influence over future power plants. Between them they will power the new cars attempting to make a place for themselves in the industry.

One of this group of engines, all of related characteristics, is the Taylor, to be produced by and/or for Crosley Corp., its sole licensee. This engine was fully described in a recent West Coast column in these pages (THE IRON AGE, Sept. 13, 1945, p. 86). A brazed assembly of die castings and stampings, this engine is considered to have very substantial possibilities if roughness inherent in its operation can be worked out. Detroit looks upon a second engine, the Skinner, as possessing possibly an even greater potential.

The Skinner, developed by Skinner Motors Inc. and now apparently partially owned by Jack & Heintz Co., Cleveland, may go into one or another of the new Kaiser and Frazer automobiles. Thereby the power plant, which has been known around Detroit for years and which almost achieved its destiny in the driving compartments of European cars several years back, achieves news worthiness it never had before.

The basic Skinner unit is a 2-cylinder assembly, horizontally flat opposed. Air-cooled, one extremely notable thing about it is that the cylinder sections, fins and all, are diecast of aluminum to precision requiring only slight finish machining. The major diecast sections are then welded together. This is a high compression engine and in testing which has been carried on during the past few months in a large Detroit laboratory has established itself as possessing high volumetric efficiency—horsepower output in the higher speed ranges has been remarkable. The weight of the 2-cylinder section appears to be somewhere around 50 lb; and hp output in finished units (as contrasted with the hand-built prototypes on which dynamometer testing has been proceeding) will probably be upwards of 28 hp.

If, as rumored, the Kaiser car will turn out to be an extremely lightweight version, lighter even than the Crosley of prewar days, it might be that a 2-cylinder Skinner powerplant would be sufficient to move it along the road, particularly in the light of the already mentioned high volumetric efficiency. By the same token, three such pairs of cylinders united in one motor and threaded by a crankshaft would suffice to power the Frazer, medium priced car of the forthcoming Kaiser-Frazer line. Dimensions of these powerplants certainly would give the designer something to work on to produce a new-looking automobile; a 2-cylinder unit measures somewhere around 18 in. across, 10 in. long and 8 in. high. Six cylinders, therefore, would scale somewhere around 30 in. long and the other dimensions would be the same.

Economy in producing an engine of this sort is obvious. Up to recently no company would use the engine because of various innate defects, if not out of fear of the unorthodox, but Jack & Heintz appears to have ironed out the engineering flaws during the war period. This was done with the objective of making the Skinner engine suitable for installation in heavy bombers as auxiliary power for heat, light, bombay doors, and other requirements. The Jahco efforts were so successful that a large contract was signed with the Air Forces just before the end of the war to install the Skinner units in B-29 and B-32 superbombers, but victory ended this contract. Since then, however, it has been partially reinstated. Jack & Heintz has bought a new building on the west side of Cleveland, supposedly to be devoted exclusively to manufacture of the Skinner engines. A facility like this is much more than enough to build the thousand or so units newly contracted for by the Air Forces, and the extra size of the plant, coupled with the visit a fortnight ago to Cleveland of the Messrs. Kaiser and Frazer for lengthy discussions with Jack & Heintz have aroused some expectation that the Skinner powerplant may find its ultimate destiny on the new cars which are supposed to start coming out of Willow Run within the next six months.

In the meantime there is other information that a 2-cylinder Skinner engine might be used on the domestic car which Mathis plans to manufacture on Long Island for the domestic trade. To be an ultra small car, as the Kaiser car may turn out to be,

Bennett Forms Company

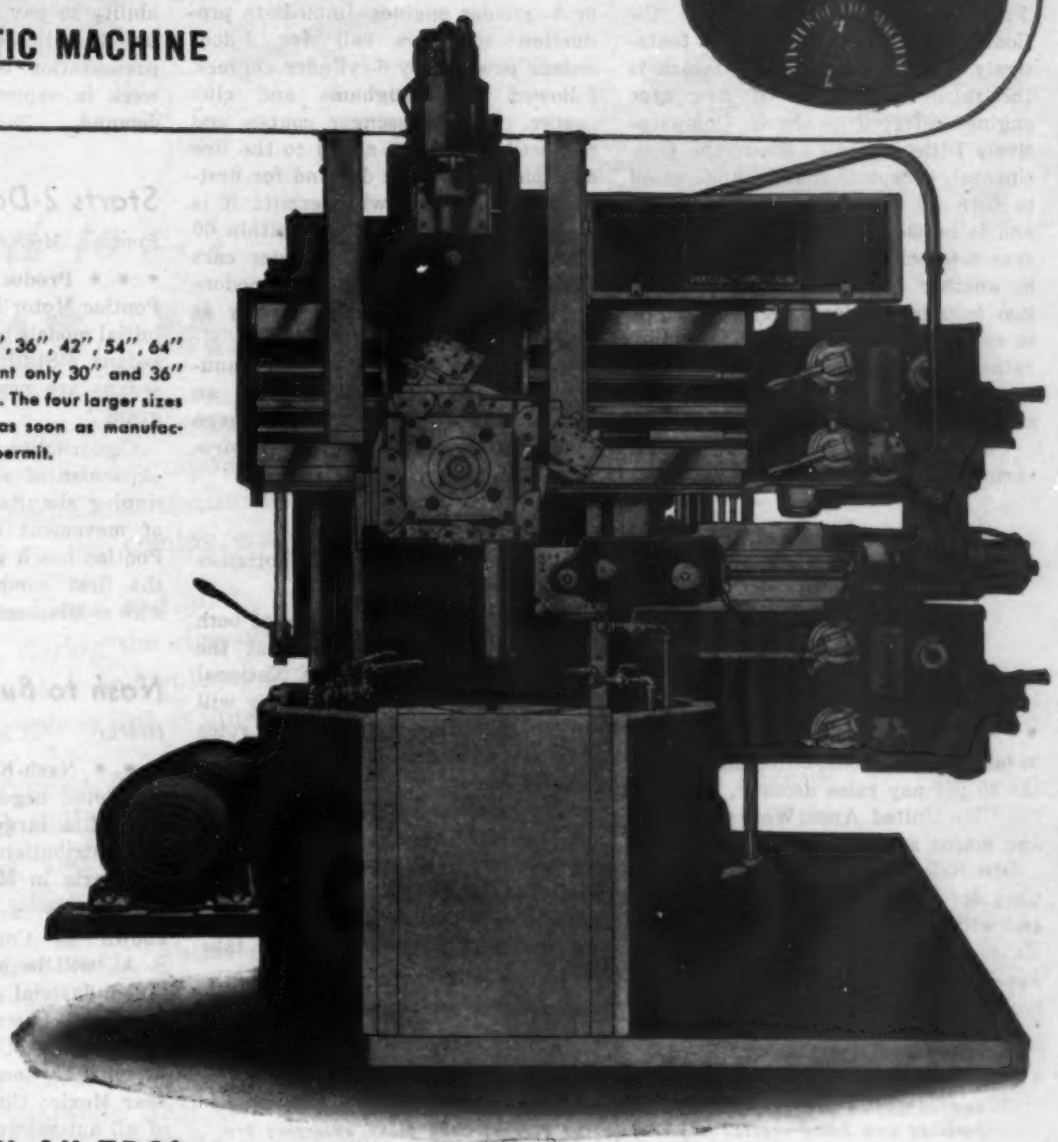
Detroit

• • • Harry H. Bennett, whose resignation from the Ford Motor Co. some weeks ago stirred up the largest reshuffling of personnel at the Rouge in many years, has formed a firm of manufacturers' agents, the B. G. F. Manufacturers Representatives Co.

Partners in the new venture are Byron Geller, former State Assistant Attorney General, and Stanley Fay, formerly assistant to Bennett at Ford. Offices have been established in the Penobscot Bldg.

ONLY A BULLARD MAN-AU-TROL V.T.L. ALLOWS MANUAL OPERATION OF AN AUTOMATIC MACHINE

BULLARD
MAN-AU-TROL



Machine sizes: 30", 36", 42", 54", 64" and 74". At present only 30" and 36" sizes are available. The four larger sizes will be available as soon as manufacturing conditions permit.

. . *because* MAN-AU-TROL *is*

the automatic control that is as versatile as manual control

When you decide to buy a Bullard MAN-AU-TROL V.T.L., your chief reason will be that you want all the benefits of an automatic lathe *plus* all the versatility of a manually-operated machine.

To these benefits, add another. Suppose you have your MAN-AU-TROL V.T.L. all set up for automatic production of a piece with Bullard standard-type tooling. Along comes a rush job for one piece of an entirely different kind. The chances are that you will find it profitable to change the tool set up for manual operation on this one piece . . . without, of course, disturbing the automatic cycle. When that one-piece job is finished, you quickly reset your tooling by means of gauges, and before you know it, the machine is back on the production run with the automatic cycle.

Other benefits you will get from the Bullard MAN-AU-TROL V.T.L. are fully described in Bulletin MAV-G-1. Write today. The Bullard Company, Bridgeport 2, Conn.

BULLARD CREATES *NEW METHODS* TO MAKE MACHINES DO MORE

the Mathis undoubtedly needs an engine somewhat of the Skinner or Taylor characteristics.

Should the Skinner engine be finally specified for the Kaiser and Frazer cars, it would replace the Continental engine which was tentatively indicated earlier, and which is the third of the trio of new type engines referred to above. Comparatively little is known about the Continental, except that it is understood to turn up somewhere around 76 hp and is horizontally opposed. There is reason to believe that this engine may be another one buildable in units of two cylinders apiece, even though it is an orthodoxly machined assembly, rather than built up mainly of die castings, stampings and other such mass produced pieces.

Turning from the fascinating sprightliness of speculation to more mundane matters, Hudson announced last weekend that its 1946 cars will be offered in two distinct "style lines," the Super series and the Commodore series, each available with 6-cylinder or 8-cylinder engines. Immediate production schedules call for 4-door sedans powered by 6-cylinder engines, followed by broughams and club coupes. Three-passenger coupes and convertibles will be added to the line as rapidly as urgent demand for first-production models will permit; it is hoped to build convertibles within 60 days. Output of the 8-cylinder cars in both the Super and Commodore series will be produced as rapidly as possible.

In addition, Hudson will be manufacturing cab pickup vehicles in an effort to share in the extremely large and continually mounting requirements for ¾-ton size units.

o o o

No Progress Reported In Auto Labor 30 Pct Pay Raise Dispute

Detroit

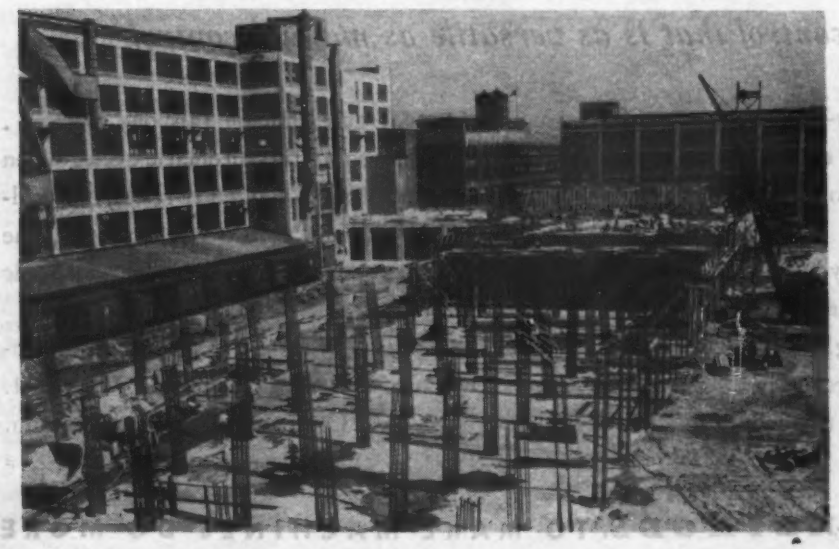
• • • **Little progress has** been made in labor negotiations, centering around the 30 pct pay raise demand, between the CIO United Auto Workers union and major automobile companies.

Discussions of the union with Chrysler Corp. have been sporadic and without progress. While the sessions at General Motors have been somewhat more regular, there has been no development as yet which would seem to bring the negotiators closer together.

One outcome of discussions at both plants thus far has been that the companies have notified the National Labor Relations Board that they will not permit forthcoming strike votes to be held on company property. The General Motors vote is scheduled for Oct. 24, and the Chrysler vote a day later. NLRB, therefore, will have to set up voting booths on outside premises. Ford Motor Co., which will have a strike vote coming up later on, has not indicated whether it will take similar action.

In a letter last weekend to General Motors, the auto union charged that the company was blocking any progress toward an agreement. It was claimed that the corporation "would not discuss its financial position or its ability to pay a wage increase." The union indicated it plans to begin presentation of a factual brief this week in support of its 30 pct wage demand.

NEW STUDEBAKER BUILDING: *Part of Studebaker's* $16,000,000 *reconversion and expansion program includes this truck cab manufacturing and receiving building now being erected adjacent to the present body plant, enlarging production space and making possible a smoother flow of materials through the plant.*



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Starts 2-Door Pontiacs

Pontiac, Mich.

• • • **Production has begun** at the Pontiac Motor Div. of General Motors, initial models being 2-door streamliner sedans. Station wagons and 4-door sedans are next on the Pontiac program.

Construction of new buildings and expansion of present facilities is continuing simultaneously with the start of movement on the assembly line. Pontiac has a goal of 500,000 cars in the first complete production year, with employment of 16,000 persons.

•

Nash to Build in Mexico

Detroit

• • • **Nash-Kelvinator Corp.** has completed negotiations for the erection of a large assembly plant and the distribution of Nash automobiles and parts in Mexico.

The new assembly plant, to be known as Construcciones Fabriles, S. A., will be operated by an important industrial group in Mexico headed by Col. Lawrence Higgins, formerly with the U. S. Dept. of State. It will be located at Tlalnepantla, near Mexico City, where about 70 pct of all automotive sales in the country are made.

The Mexican plant, according to George W. Mason, Nash-Kelvinator president, is one of the series of distributor assembly plants being re-established throughout the world.

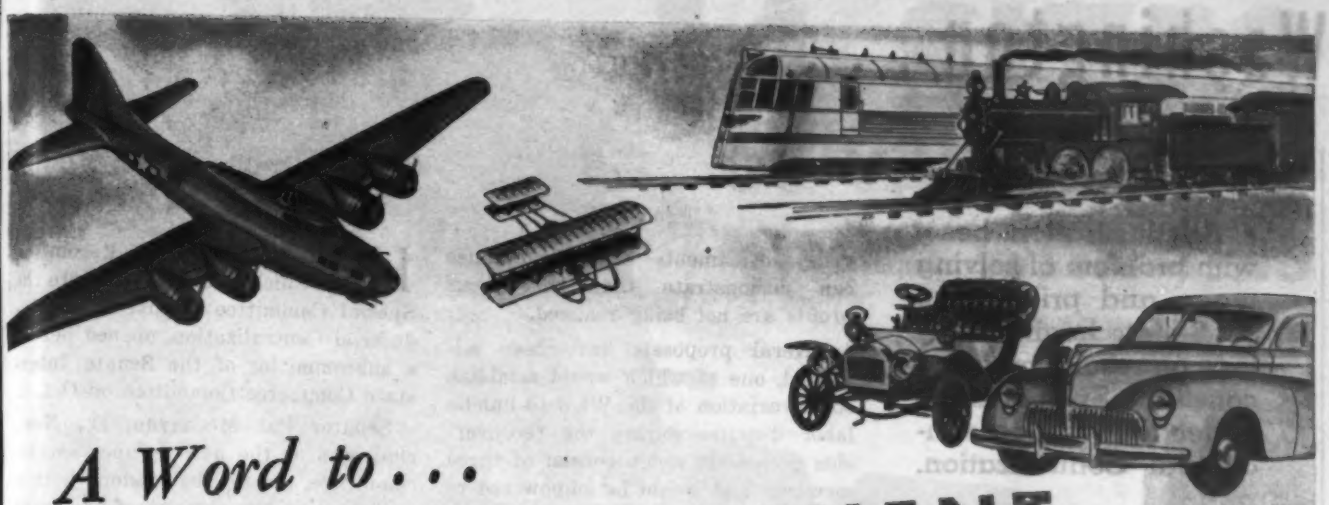
•

Lincoln Files Counter Suit

Cleveland

• • • **The Lincoln Electric Co.** has filed a damage suit against the Linde Air Products Co. in the U. S. District Court here.

This suit follows one filed in the U. S. District Court in Chicago Oct. 2 by the Linde Air Products Co. against Lincoln alleging infringement in connection with the use of a welding process.



A Word to . . .
PLANT MANAGEMENT

● NOW is the time to modernize your plant—to get rid of inherited equipment and old, outdated equipment. Obsolete machinery reduces plant efficiency and increases manufacturing costs. And you cannot afford to handicap yourselves in the coming era of intensive competition.

Murchey machines and tools, modernized to the nth degree, proved their capacity, during the rigorous needs of war, to speed up production and to deliver precision and volume production. Their cost-cutting, time-saving, speed-assuring role is just as important NOW!

For over 40 years, Murchey Self-Opening Die Heads, Collapsible Machine Taps, Thread Milling Machines, Tapping Machines, Bolt and Pipe Threading Machines, and all other threading tools, have been recognized as the standard by which all threading equipment is judged and evaluated.

Murchey continues "Ahead of The Times"! In greater numbers than ever before, industries faced with any variety of threading problems, turn to Murchey as the organization best qualified to help them out of their difficulties. And Murchey pledges its resources—trained skill—engineering leadership — to maintain their confidence. Past, Present and Future, the same always holds true . . . *"You Can Depend on Murchey."*

MURCHEY MACHINE & TOOL COMPANY
DETROIT 26, MICHIGAN

MURCHEY

Washington . . . L. W. MOFFETT

• Administration beset with problem of solving wage and price issue . . . Senate begins hearings on resolution to reconstitute Special Committee to Investigate Industrial Centralization.

WASHINGTON — Keeping six balls in the air without a muff is a juggler's feat of dexterity that appears simple by comparison with a task the Administration has undertaken.

Having the aspect of lifting one's self by the bootstraps, it is attempting the wizardly trick of stabilizing wages and prices at levels which would permit at least "moderate" increases in both, and at the same time compensate for overtime wage losses and avoid a price squeeze that would slow up reconversion.

Solution of the present wage situation hinges to a great extent on overcoming four hurdles: (1) Compromising labor's demands without loss of political "face"; (2) settlement of wage disputes without precipitating inflation; (3) avoiding legislative action likely to restrict unions by increasing contract responsibility; (4) formulation of government policies giving greater emphasis to departmental rulings without apparently favoring labor or industry and without internal policy conflicts.

Continued warnings by OPA spokesmen that wage increases on a percentage basis will develop demands by manufacturers for price boosts to compensate for increased labor costs apparently have fallen on deaf ears at least insofar as increases of less than 15 pct are concerned. OPA meanwhile strongly favors individual price adjustments where companies can demonstrate that base year profits are not being realized.

Several proposals have been advanced, one of which would establish some variation of the WLB to handle labor disputes during the reconversion period. It would consist of three members and would be empowered to grant wage increases of not more than 15 pct. Price increases to compensate for greater labor costs would be limited to 5 pct. This of course would be a departure from the Administration's wage policy set forth in the Executive Order of Aug. 18 permitting wage increases "upon the condition that such increases will not be used in whole or in part as the basis for seeking an increase in ceiling prices."

Both the "liberalized" and the old policy strikes industry as being an attempt at economic legerdemain that cannot be performed. Nor can labor be expected to do the impossible. If it could produce as much in the shorter time as it did in the regular plus overtime period, it would entirely deserve as much pay and without making price increases necessary. If a technique is found to do this, it would be the greatest boon possible in the way of prosperity for all segments of American life.

Meanwhile the Administration is still depending on the Labor-Management Conference scheduled for Nov. 5 to solve some of the curret problems and, it is hoped, avoid the necessity for remedial legislation. Congress too would prefer to have the matter settled without having it thrown into the lap of the legislative branch. Industry's expressed desire to open the conference earlier was not concurred in by labor representatives who feel that they will have insufficient time to prepare their case as it is.

The conference agenda has almost been completed with every effort being made to exclude broad issues which might unduly provoke disagreement between labor and management factions. The requirement that there be unanimous agreement on all issues before the conference lends considerable doubt that there will be unanimity on but few fundamental issues concerning which there would probably be little disagreement in any event.

HEARINGS on Senate Resolution 15, which would reconstitute the Special Committee to Investigate Industrial Centralization, opened before a subcommittee of the Senate Interstate Commerce Committee on Oct. 9.

Senator Pat McCarran, D., Nev., chairman of the new defunct special committee, opened the sessions with a zealous plea for passage of the resolution.

The Nevada Senator claimed that he would like to achieve decentralization of the nation's industrial plants not by removal of any existing plants but by setting up now plants in supposedly undeveloped areas, as well as continued operation of government steel, aluminum and other plants in those areas.

In attempting to prove his point, Senator McCarran dragged out the old accusation that industry officials who have served in WPB during the war used their government positions to further concentrate industry in the United States.

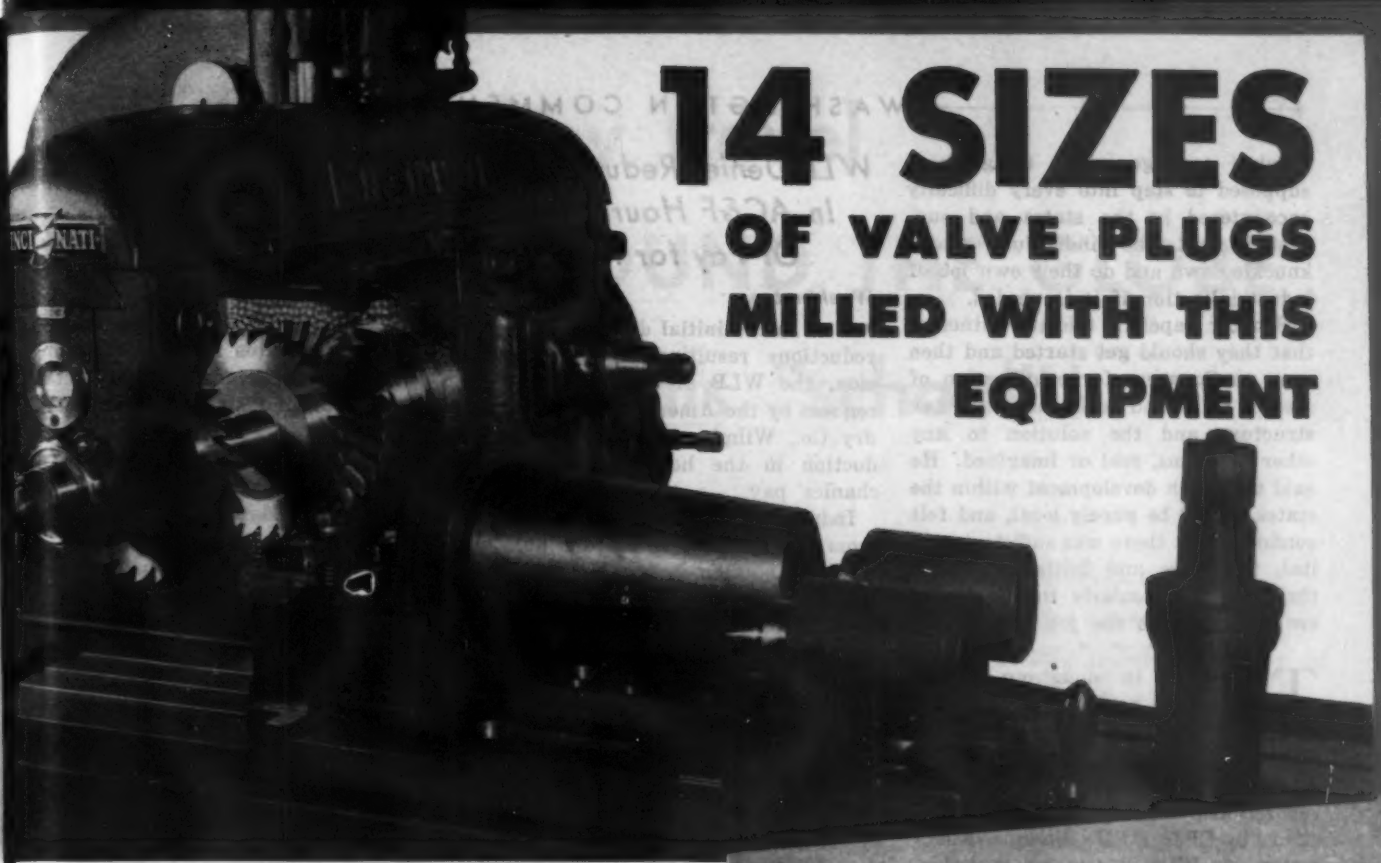
Advocating an end to sectional discrimination, but certainly not a "government planned economy," Senator McCarran said that his ideas would stimulate the sale of goods throughout the country.

Admitting that the title of his old committee had some unfortunate connotations, he suggested changing the name of the committee to the Special Committee on Industrialization.

He was followed by representatives of various civic organizations from the western and southern states who requested government aid to such an extent in setting up industries in their areas that they were rather sharply dealt with by some of the senators making up the subcommittee.

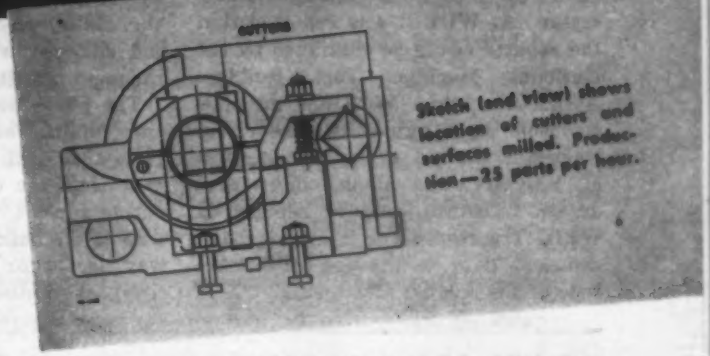
Senator Brien McMahon, D., Conn., chairman of the subcommittee, and Senator Homer Capehart, R., Ind., both admitted that there are several things government could do to expedite industrial expansion, mainly in revisions of the current tax structure, but pointed out that these conditions affect all business and do not discriminate against the West, South, or Southwest, the main objects of Senator McCarran's oratory.

While the members of the subcommittee indicated that they would eventually approve the resolution they deplored the fact that the country has



14 SIZES OF VALVE PLUGS MILLED WITH THIS EQUIPMENT

CINCINNATI No. 2-24 Automatic Rise and Fall Miller with equipment devised by Cincinnati Application Engineers to mill the wrench end of 14 sizes of valve plugs. The rise and fall feature takes care of squaring out the radius which would ordinarily be left by the cutters.



Sketch (end view) shows location of cutters and surfaces milled. Production—25 parts per hour.

Have you a family group of parts in your shop? If you do, perhaps they can be machined at much lower cost my merely devising *one set of equipment to handle the whole family.* And manufacturing quantities of individual parts need not be exceptionally large to gain the greatest advantage through the use of automatic equipment.

The setup shown here illustrates what was done to reduce the cost of milling the wrench end of 14 sizes of valve plugs. A standard CINCINNATI No. 2-24 Automatic Rise and Fall Milling Machine was equipped with a two-station fixture and the proper cutters by Cincinnati Application Engineers. A square is milled on the part held in the inside station, and then it is transferred to the station next to the operator where one corner is milled off to form a five-sided shape. (see drawing). The entire cutting cycle proceeds automatically, started with the flip of a small starting lever. To increase output still further, the inside station indexes automatically (to mill four sides of the square) through a hydraulic circuit.

The Application Engineers here at Cincinnati Milling will be glad to work with you on your machining problems, and to devise the best method and equipment for lowest cost production.

CINCINNATI

CINCINNATI No. 2-24 Automatic Rise and Fall Miller. Catalog M-909-1 containing complete specifications, will be sent on request. Sweet's Catalog File for Mechanical Industries gives a brief description.

THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO U. S. A.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES

reached a stage where Congress is supposed to step into every difficulty encountered in the states and suggested that the individual states knuckle down and do their own job of industrialization if it is needed.

Senator Capehart told the witnesses that they should get started and then come to Congress for equalization of freight rates and revisions in the tax structure and the solution to any other problems, real or imagined. He said that such development within the states should be purely local, and felt confident that there was sufficient capital, ingenuity and initiative within the states, particularly the far western states, to do the job.

* * *

THE WPB in sloughing off its widespread activities prior to its completely folding up on Nov. 1, ceased to issue monthly statements on machine tool shipments with the July report. The reports will not be continued by CPA, WPB's diminutive successor. At WPB it was reported that the reports would be continued by the National Machine Tool Builders Assn., Cleveland. WPB had intended to issue an August statement but when the blessed event in the form of VJ-Day came along, many producers failed to send in reports to WPB. The result was it did not have sufficient data to proceed with issuance of the August statement.

WLB Denies Reduction In AC&F Hourly Rate Of Pay for Mechanics

Washington

• • • In the initial decision on wage reductions resulting from reconversion, the WLB on Oct. 10 denied a request by the American Car & Foundry Co., Wilmington, Del., for a reduction in the hourly rate of mechanics' pay.

Industry representatives dissented from the decision which did not include an opinion.

The Board directed a continuation of rates of $1.04, $1.12 and $1.20 for third, second, and first class mechanics on railroad carbuilding and repair work on the basis that their jobs had not changed and they were paid these rates when the company was engaged in shipbuilding and ship repair work. The important consideration in such cases, it was pointed out, is whether the skills needed for the particular job changed with the switchover to the new activity.

The plant was engaged entirely in shipbuilding and ship repair work from 1940 until September 1944. Since that time the company has been devoting the major portion of its facilities to the building and repair of railway passenger cars, but had not entirely discontinued shipbuilding and ship repair work when the dispute with the union was certified to the Board for settlement.

In requesting the rate reduction, the company contended that the content of the jobs in the two industries is different, that it must be allowed to reduce its rates in order to maintain its competitive position in the railway car industry, and that the Stabilization Act of 1942 is not applicable because the company is not seeking to reduce shipbuilding rates, but rather is asking the Board to set rates for its railway car work.

The union on the other hand maintained that the job descriptions for shipbuilding and repair work are also applicable to carbuilding and repair and that rates on carbuilding and repair work are generally higher than on shipbuilding.

WPB Removes Controls On All Construction

Washington

• • • Effective Oct. 15, WPB has revoked the construction Order L-41. That the order was to be revoked on that date was announced on Sept. 18 by WPB Chairman J. A. Krug and John W. Snyder, Director of War Mobilization and Reconversion.

Also revoked were preference rating orders affecting construction (the P-19 and P-55 series) and Directive 24, which delegated authority to the National Housing Agency to authorize housing construction. The revocation of Order L-41 removes sales price ceilings on NHA's H-1 and H-2 war housing programs previously set by NHA, acting as agent for WPB.

Removal of price ceilings through elimination of WPB controls on construction is not to be construed as an expression of opinion on the need for such ceilings generally, WPB officials pointed out. The need for control over housing sales prices as a general matter is currently under discussion by the OPA and OWMR, they said, and the results of these discussions will be presented to Congress.

Though the revocations remove all direct WPB controls over construction, the use of lead and tin are still restricted and WPB's general inventory order, Priorities Regulation 32 remains in force, WPB said. Priorities assistance in obtaining bottleneck construction materials and components will be given when absolutely necessary under the rating structure set up by Priorities Regulation 28.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

IF YOU FERGET TO PUT YOUR BELT AROUND SOME O' THEM HOPE BOXES YOU LOSE TH' WORKS-- I THINK HE'S LOST EVERYTHING BUT A GRAVY SPOT!
WELL, WHY SHOULD HE LOOK? HE WON'T KNOW TILL HE GETS HOME IF IT'S A SHORTAGE OF MEAT OR LOST IN TH' RUSH!
10-19 J.R.WILLIAMS
T. M. REG. U. S. PAT. OFF.
"THE TRUNK MYSTERY"
COPR. 1945 BY NEA SERVICE, INC.

They travel

HALFWAY AROUND THE GLOBE

to attend this "school"!

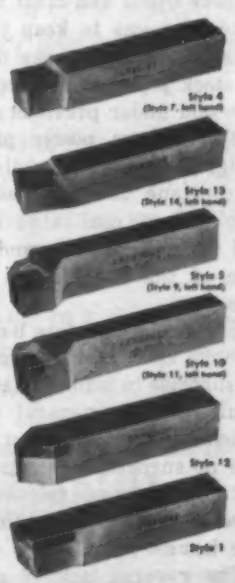
When the urgent call for defense—then war—production sounded throughout the nation, industry faced the huge task of swiftly training millions of "green" workers from all walks of life.

Carboloy Company—to fulfill its part in this tremendous undertaking—quickly expanded its long-established facilities for basic training—in fundamentals of carbide tool use and maintenance; immediately enlarged its training course quarters at Detroit.

Since Pearl Harbor, industry and government have sent to this "school" supervisory personnel from 38 states and many Allied countries—including even far-off Australia—halfway round the globe! Each man receives six days of intensive training covering actual shop work, practical "lecture" sessions, and discussion-reviews of Carboloy Training Films. He returns equipped to quickly pass this training along to supervisors and operators in his own plant. By this procedure, more than 2500 key men in plants engaged in vital war work have been prepared to meet their carbide training needs swiftly and efficiently.

So valuable is this Training Course in effecting reduced machining costs and increased production through a proven method of centralized control on carbide use in each plant, that for years it has been a permanent part of Carboloy service. Plants reconverting to civilian manufacture are invited to enroll their key supervisors in this free course. It was a proven aid to war production—and will be sound preparation for the highly competitive postwar era. Send for descriptive booklet—GT-155.

Effective training in carbide use, plus availability of low cost standard Carboloy Tools such as these, has played a vital role in war—and will help plants prepare for the competitive postwar era.



CARBOLOY COMPANY, INC.

11153 EAST EIGHT MILE AVE., DETROIT

Sole makers of Carboloy Cemented Carbides

CHICAGO • CLEVELAND • HOUSTON • LOS ANGELES • MILWAUKEE • NEWARK

PHILADELPHIA • PITTSBURGH • THOMASTON

Carboloy Products are also sold by leading Mill Supply Distributors

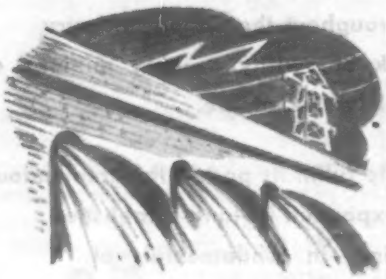
Booklet on Request

CARBOLOY (TRADE MARK) CEMENTED CARBIDES *Service*

West Coast . . .

OSGOOD MURDOCK

• Independent steel buyers organize syndicate to underwrite integrated industry as Geneva shuts down . . . Western States Council rules Alcoa out . . . Private intercoastal shipping resumed.



SAN FRANCISCO—The long expected closing of Geneva has finally occurred with scant attention from any but those steel circles directly interested (see THE IRON AGE, Sept. 20, p. 110).

Sam Husbands, head of DPC, ordered Geneva's president Walther Mathesius on Oct. 11 to terminate rolling mill operations and steel production—on completion of present plate mill schedules—prior to Oct. 12.

Dr. Mathesius was authorized to continue the operation of one battery of coke ovens and blast furnace using coke oven gas to keep the remaining three batteries of coke ovens hot and to stock pig iron in excess of quantities sold under previous sales policies.

The Geneva power plant and the Keigley quarry were also authorized to continue under limited production. The Geneva coal mine is ordered to sell its requirements under the direction of the Solid Fuels Administration.

Since Geneva's fate has been in the balance since last spring it comes as no surprise to informed steel quarters. Similarly, the general apathy with which the announcement was greeted was no surprise to anyone other than the Washington tub-thumpers who have successfully complicated the entire issue.

The general lack of confidence on the part of the public lends weight to the Surplus Property Board's recent pronouncement that "there are either limited possibilities for the postwar competitive operation of Geneva, or there is apprehension concerning reasonable valuation and financing arrangements."

Final shutdown of Geneva came simultaneously with a hearing before a Senate subcommittee at which a group of regional spokesmen for industry requested the re-establishment of the McCarran committee on decentralization of industry. But the petitioners seemed to receive a cool reception. Spokesmen cited, among other plaints, high freight rates to the West, and were told that a Senate subcommittee could do nothing about freight rates. Assemblyman Gardiner Johnson, representing the California Commission on Interstate Cooperation, said that it is cheaper to go to Asia for iron ore than to ship it across country by rail. Pressed as to what he thought a Senate subcommittee could do about decentralization of industry, Mr. Johnson is quoted as having replied "that such a committee could convince venture capital in the West that men in public office have an interest in going ahead and investing."

SENATOR HOMER CAPEHART of Indiana asked each witness why his community didn't go ahead and establish an industry of some kind as other states have done. "Why don't you give some tax exemptions for a few years? You'll find all industries started with the help of local people who bought stocks and gave a boost in other ways. We live in an age where everyone looks to Washington to do things."

Almost as though designed to anticipate just such open-handed advice several developments appear to be nearing the crystallization stage. CF&I has advised the RFC that its management is preparing a new bid for Geneva. Henry Kaiser says that he is as interested as ever in Geneva and intends to submit a proposal to take over the Geneva mill. Gus Backman, secretary of the Salt Lake City Chamber of Commerce, reiterates that the new order makes no difference in the plans for disposal of the plant and forecasts "several" bids.

The most beguiling development, however, is the apparent increasing determination on the part of independent Pacific Coast steel buyers and fabricators to keep both Geneva and Fontana alive and operating. K. T. Norris, president of the Norris Stamping & Mfg. Co., and chairman of the Western States Steel Council, last week returned to Los Angeles from Washington conferences with President Truman and others, and reports that his trip bore two results: First, a formula has been arranged which Mr. Kaiser may submit to RFC with fair chances of acceptance; second, through talks with Mr. Symington. head of RFC Surplus Property Board, the Geneva situation may be brought to a head.

Mr. Norris permitted himself to be reported not only as head of the Western States Steel Council, but also as a member of a syndicate prepared to make an offer designed to maintain an integrated western steel industry if old-line companies—either eastern or western—fail to make such an offer themselves.

Although Mr. Norris was apparently reluctant to elaborate any further at the moment, this pronouncement is being taken with considerable gravity by coast headquarters of other steel companies.

Those members of the industry not caught in the middle of such a development have been speculating for some time as to the potentialities of some such development. They recall that Mr. Fairless of U. S. Steel put himself on record as ready to buy hot rolled coils from Geneva if the latter mill were to find a buyer. Now the independent fabricators are talking turkey—and their own money. Mr. Roach of Consolidated Steel and Mr. Norris of Norris Stamping have suggested that Fontana could be the finishing mill and Geneva the raw pig and hot rolled producer.

As there seems to have been a few mental reservations regarding U. S. Steel's long-term interest—or lack of it—in Geneva now that the contemplators are asking what will happen if the U. S. Steel builds a sheet mill at its Pittsburg, Calif., site and contracts for hot rolled coils from Geneva-owned buy the largest steel buyers on the coast. The feeling seems to be that U. S. Steel will have relieved itself of the stigma of "mo-

Fosdick HIGH SPEED DRILLS

meet rigid precision and production demands on holes up to 1 1/2"

● The equipment used in tool and die shops must not only be flexible to handle a wide range of work but must be capable of meeting precision requirements common to this class of work.

The Fosdick High Speed Sensitive Drills shown are typical of the type of Fosdick equipment being used in hundreds of tool and die shops where accuracy and costs are important factors.

The wide range of speeds available—the ease with which they can be changed—the simplicity of operation makes these sturdy drills popular for drilling holes up to 1 1/2 inch diameter.

Furnished in any number of spindles up to six—available with tapping spindles. *For complete information write for Fosdick High Speed Drill Bulletin H. S. I.*

FOSDICK MACHINE TOOL COMPANY
CINCINNATI 23, ... OHIO

nopolist" and still have found itself in a virtual, if not financial, partnership with a potent western buying group. Where, speculators ask, would that leave the other traditional suppliers?

DISPOSITION of aluminum plants in the West also came in for its share of attention last week as the light metals committee of the Western States Council met in Salt Lake City.

A resolution of this group concurred with the recommendations of three federal agencies that the Aluminum Corp., of America be eliminated as a possible purchaser of those plants now up for sale.

Immediate action was urged by the resolution to stimulate the transition from a war to a peacetime economy. In addition to the known offers from Alcoa, the Reynolds Metal Co., Olin Industries and Columbia Metals Corp., a new bidder appeared. Capt. Robert T. Banks, Jr., of Salt Lake City, representing Hybinette & Carey and associates, Wilmington, Del., without further identifying his organization, announced the intention of his principals to bid on the RFC owned aluminum properties.

* * *

The Bank of America became the largest bank in the world last month. Total deposits as of Sept. 29 were $4,748,300,000, and total resources $5,037,500,000, compared to the Chase National Bank's deposits of $4,620,618,000 and resources of $4,965,394,000.

* * *

While the successful Kaiser-Fraser stock flotation continued to focus the attention of the auto minded public on that firm's progress, a new three-wheel car manufactured on the Pacific Coast appeared on the streets of Los Angeles.

Called the Californian, the new machine is reported to be built on principles involving aircraft production methods.

The car is said to weigh 1000 lb., is expected to do a minimum of 40 miles to the gallon, and has been clocked at 116 m.p.h. on the open highway. The present motor, which is rumored to be one produced by Kinner Motors, is believed to have been driven more than 250,000 miles on test in the last three years. Manufacturers of the car are as nearly as can be determined, the Warner Manufacturing Co., said to be the outgrowth of the Die Cast Corp.

Intercoastal shipping is being resumed this week with the Luckenbach S. S. Co., leading the way. The initial operations for intercoastal, and coastwise which is soon to follow, will be undertaken by private companies acting as agents for the government. Cost experiences will subsequently serve as a guide as to the necessity for upward revision of freight rates.

The Gulf offices of Luckenbach are being swamped with requests for specific data as to departure and arrival dates almost down to hours and minutes. There appears to be a certain reluctance on the part of local warehousemen to be caught with higher cost rail freight steel on their hands—which accounts in a measure for the recent apprehensive nature of local steel buying.

With water shipment taking 17 days from New York to San Francisco in the Victory type ship, against 10 to 14 days with possible delays by rail, local steamship lines are hoping to obtain a greater share of the freight than the prewar 75 pct.

Raise California Ceilings On Oil Country Tubular Goods

Washington

• • • **Effective Oct. 17, OPA has authorized an increase in warehouse and jobber ceiling prices for oil country tubular goods in California provided elsewhere in the United States. The pricing agency said that the increase was authorized to relieve a shortage of oil country tubular goods in California where prices have been from 5 pct to 7 pct below levels in other parts of the United States.**

Warehouse and jobber sellers were authorized to use as their ceilings the maximum prices appearing in Price List No. 24 of the Oil Well Supply Co., Distributor of National Tube Co. Previously, ceiling prices were the sellers' own selling prices on April 16, 1941, provided they did not exceed those in Price List No. 24.

While this change is applicable to all resellers throughout the nation, it was in California principally that ceiling prices were below those listed in Price List 24. This, OPA said, was because California sellers on the base date had been charging the prices for oil country tubular goods appearing in Price List 36, also supplied by the Oil Well Supply Co. These prices were somewhat below those in Price List 24.

New Earthmover Line

Cedar Rapids, Iowa

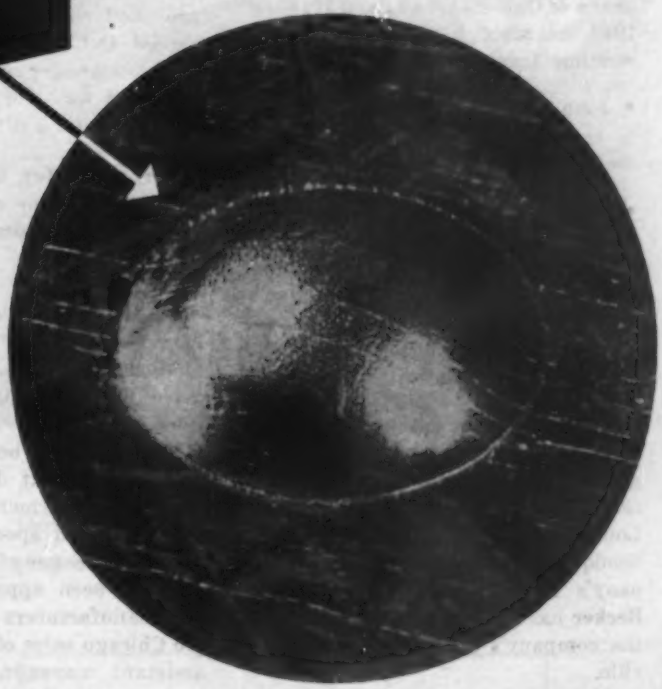
• • • **Production of two newly designed scrapers for use with International Harvester, Case, and other rubber tired industrial tractors is scheduled to get under way early in 1946. In addition, a job-proved LaPlant-Choate cable power control unit will be ready for merchandising the company's complete line of cable-operated dozers and scrapers with any crawler type or high speed prime mover on the market. Meanwhile LaPlant-Choate hydraulic dozers, big capacity scrapers, rippers and land clearing tools will continue to be sold through Caterpillar Tractor distributors and export dealers throughout most of 1946.**

QUICK RECONVERSION: ***Gasoline truck bodies originally slated for the armed services get their finishing touches before delivery to civilian operations. The scene is at the Butler Mfg. Co. plant at Kansas City.***

If You Draw Zinc-Coated Sheets You Can Get....

The zinc coating cracked and flaked when this ordinary galvanized steel sheet was put to the ball impact test. Note the loose scales of zinc at the point of impact, which means complete loss of the protective zinc coating.

This or This



The zinc coating on a sheet of ARMCO ZINCGRIP is smooth and intact after the same test. Here the special zinc coating s-t-r-e-t-c-h-e-s with the steel—gives your products unbroken zinc protection.

Does "*deep-drawing* zinc-coated steel" bring to mind the kind of workable zinc-coated sheets you've always wanted?

Then ARMCO ZINCGRIP is the practical answer for your drawn and formed products. The specially-applied zinc coating will take *as severe a draw as the base metal.*

Armco Research created ZINCGRIP for tough fabricating jobs, such as deep draws and double-lock seaming. The coating stretches and "flows" with the steel in the press, assures unbroken zinc protection for every part. There is no flaking or peeling.

When your fabricated products are to be painted, you can obtain ZINCGRIP with the mill-Bonderized ARMCO PAINTGRIP finish. It takes paint without pre-treatment and prolongs its life.

If you'd like to give your products the extra manufacturing and selling advantages of ARMCO ZINCGRIP, let us tell you more about this special-purpose sheet steel. Write for the illustrated ZINCGRIP booklet. The American Rolling Mill Company, 2861 Curtis Street, Middletown, Ohio.

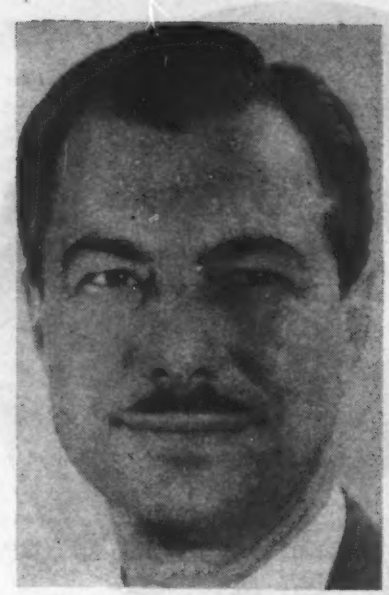
Export: The Armco International Corporation

Special-Purpose Sheet Steels

The American Rolling Mill Company

ZINCGRIP ARMCO STEEL

PERSONALS



L. L. ADAMS, assistant to vice-president, traffic, U. S. Steel Corp. of Delaware.

• **L. L. Adams** has been appointed assistant to vice-president, traffic, U. S. Steel Corp. of Delaware, Pittsburgh. Associated with the Chesapeake & Ohio Railroad from 1918 until 1942, he since has been engaged in wartime transportation activities.

• **John E. Marquis** has been appointed to the Ceramic Laboratory Staff of the Pemco Corp., Baltimore.

• **Col. Frederick C. Horner**, formerly assistant to the chairman of General Motors Corp. on transportation matters, is returning to the corporation as director of the field operations section of the distribution staff, with headquarters in Detroit.

• **George L. Root** has joined the Reynolds Metals Co. as a development engineer on aluminum textile applications with temporary headquarters in Louisville. After Nov. 1, Mr. Root's headquarters will be at the company's New York office. **Robert D. Becker** has been appointed manager of the company's Utensil Div. in Louisville.

• **Ralph R. Peo** has resigned as vice-president and a director of the Houdaille-Hershey Corp., and as general manager of the Houde Engineering Div. of the company in Buffalo.

• **Nathan F. Vanderlipp**, executive engineer of the Curtiss-Wright Corp. Airplane Div. and former general manager of the company's Buffalo area plants, has resigned.

• **Edward Edmunds** has been appointed chief metallurgist, Ajax Electric Co., Philadelphia.

• **Clifford G. Strote** has been appointed purchasing agent for H. C. Frick Coke Co., U. S. Coal & Coke Co. and their associated companies, U. S. Steel subsidiaries. Mr. Strote succeeds **George W. Brown**, who is retiring after 53 years' association with the company.

• **Howard A. Knox** has been appointed assistant manager of sales, tin mill products of the Jones & Laughlin Steel Corp., Pittsburgh. For the past five years he has been assistant to the manager of sales of the Tin Plate Div., Carnegie-Illinois Steel Corp.. **J. Garfield Lorriman** has been appointed assistant district sales manager of the Jones & Laughlin Steel Products Co., Toronto, Ont., a subsidiary of J & L.

• **J. H. Morrison**, operating vice-president of Sharon Steel Corp., resigned Oct. 1. He became general works manager of Sharon Steel in 1940 and was elected operating vice-president and a director in 1942.

• **Guy J. Coffey** has been appointed vice-president in charge of sales of the Chicago Pneumatic Tool Co., New York.

• **C. H. Schiller** has been appointed manager of market research and sales analysis for the American Steel & Wire Co., Cleveland, a U. S. Steel Corp. subsidiary. At the same time, **H. M. Ridlon** has been named assistant manager of that division and **A. W. Ruttkamp**, formerly manager, has been assigned special duties for the general manager of sales. **E. A. Murray** has been appointed manager of the manufacturers products dept. in the Chicago sales office and **C. J. Quill**, assistant manager. **J. H. Vail** has been appointed assistant director of industrial relations. He will be transferred to the Cleveland office.

• **N. F. Adamson** has been elected vice-president in charge of sales and engineering of the Twin Disc Clutch Co., Racine, Wis. **E. C. Billings** has been named sales manager of the Racine Div. **Roger G. DeLong** has been appointed sales manager of the Hydraulic Div., with headquarters at the company's Rockford, Ill., plant, and **G. W. Buelke** has been appointed chief engineer of the Racine Div.

M. E. CUMMINGS, assistant to the president, Crucible Steel Co. of America.

• **M. E. Cummings**, previously manager of the Sanderson works at Syracuse, N. Y., of the Crucible Steel Co. of America, has been appointed assistant to the president to be located at the company's New York executive offices, in charge of operations for the Crucible specialty mills. **E. T. Walton** has been appointed assistant to the vice-president and will be located at the Pittsburgh Crucible Div. offices. Mr. Walton was previously associate director of metallurgy. **R. K. Warren**, previously chief mill metallurgist, has been named manager of Sanderson works, and **R. Schempp**, assistant to the works manager, Halcomb works, Syracuse. Mr. Schempp was previously chief metallurgist of the Syracuse district. **L. S. Fulton**, previously service metallurgist at Park works, Pittsburgh, has been appointed manager of alloy sales of Crucible's specialty mills. **J. D. White** has been appointed consultant to the company and is located at the Chicago branch, and **E. K. Streeter**, has been appointed Chicago branch manager. **J. D. White, Jr.** has been appointed manager of the Milwaukee branch.

• **M. R. Randlett** has been appointed assistant divisional director of Pittsburgh Plate Glass Co.'s Milwaukee paint factory.

• **William G. Brown** has been appointed chairman of the Sixth Regional War Labor Board succeeding **Edgar L. Warren**, recently appointed director of the U. S. Conciliation Service.

12" to 36" MORE LIFT

Northern HI-LIFT LOW HEADROOM ELECTRIC HOISTS

THE Northern Hi-Lift Electric Hoist is a long term, stable investment—not an expense. It returns continual dividends in fast, economical, trouble-free service.

CONSTRUCTION FEATURES built to stand frequent overload with greater margin of safety. The Hi-Lift Hoist has a frame of one piece, welded steel. Gears are machine cut steel, hardened for long wear. Bearings are large size, anti-friction. Motor, brakes, and accessories are carefully selected for best service and greatest durability.

A better hoist in every way—and the low headroom feature adds 12" to 36" to the effective height of your building.

Write for Bulletin H-110

OIL BATH LUBRICATION—Gears run in an oil bath—automatically feed oil to bearings. Lubrication is simple—sure.

See our Catalog in Sweet's Files of Engineering, Process, and Mechanical Industries.

NORTHERN ENGINEERING WORKS

2621 ATWATER STREET • DETROIT, MICHIGAN

• **Wm. D. Macgeorge**, formerly chief of electronics laboratory, Baldwin-Southwark, has joined the staff of Automatic Temperature Control Co., Philadelphia, in the capacity of technical consultant.

• **George E. Routh** has retired as manager of sales, reinforcing bars and construction specialties, Bethlehem Steel Co., Bethlehem, Pa. Mr. Routh's successor is **Stewart B. Brown**, a member of the sales organization's Boston staff.

• **Col. J. Tracy Hale, Jr.**, has been named vice-president of General Malleable Corp., Waukesha, Wis. He had been a director of the firm.

• **Harry M. Forman** has been appointed secretary of the Metal Specialty Co., Cincinnati, and a member of the board of directors.

• **C. J. Stevens** has been appointed regional manager in the sales dept. of the Mfg. Div., Crosley Corp., Cincinnati.

• **Junius S. Morgan**, a member of the board of directors of J. P. Morgan & Co., Inc., was elected a director of Continental Can Co., Inc., New York.

• **R. N. Landreth** has been named assistant to the vice-president of the General Machinery Div. of Allis-Chalmers Mfg. Co., with offices in Washington. **W. A. Yost, Jr.**, has been appointed assistant manager of the Allis-Chalmers steam turbine dept.

J. Harold Merrick has been elected a vice-president of Rheem Mfg. Co. He is president of a new subsidiary, Rheem Mfg. Co. of Brazil, Inc.

• **Charles H. Augspurger**, public relations director of the Airplane Div. of the Curtiss-Wright Corp., Buffalo, **Adrian W. Smith**, executive assistant to vice-president Burdette S. Wright, and **Robert W. Fausel**, manager of military liaison, have resigned.

• **R. E. Walsh** has been named assistant manager of the roll dept. of Continental Foundry & Machine Co., Pittsburgh. He will make his headquarters at the Chicago works of Continental, which is located in East Chicago, Ind.

• **Howard Spencer** has joined the Salem Engineering Co., Salem, Ohio. Mr. Spencer is a steel mill furnace engineer of long experience.

• **Waune Brinkerhoff** has been named advertising manager of B. F. Goodrich Chemical Co., Cleveland.

SHELDON MARSTON, executive vice-president, Albert Kahn Associated Architects & Engineers, Inc.

• **George H. Miehls** has been elected president of Albert Kahn Associated Architects & Engineers, Inc., succeeding the late Louis Kahn. The board of directors also named Mr. Miehls, formerly executive vice-president, as treasurer. **Sheldon Marston**, previously vice-president, was elected executive vice-president, and **Saul Saulson** and **O. L. Canfield** were named vice-presidents.

• **Vincent Manka**, formerly assistant to the president, has been appointed general sales manager in charge of sales and advertising of the Claud S. Gordon Co., Chicago.

• **Douglas Charters** has been promoted to the position of assistant district manager for the southwest territory of Turco Products, Inc. He will be located in the Houston, Tex., district office, serving under the direction of V. O. Poole, district manager of the office.

• **Dr. Lawton A. Burrows** has been appointed assistant manager in charge of research, Technical Div. of the explosives dept., E. I. du Pont de Nemours & Co., Wilmington, Del. He succeeds **Dr. W. E. Lawson**, a former director of eastern laboratory, Gibbstown, N. J., who is assigned to special duties. **Dr. Wesley M. Nagle** was appointed assistant director at eastern laboratory.

• **George A. Fowles** has been appointed sales manager for geon thermoplastics on the plastic materials sales staff of B. F. Goodrich Chemical Co., Cleveland. **J. H. Field, Jr.** has been named manager of technical service for the sales staff; **M. Scott Moulton**, manager of geon coating and film materials for the paper and textile fields; and **Clyde D. Segner**, Chicago district geon sales representative.

• **F. E. Rolston** has been appointed packaging engineer of the Dearborn Chemical Co., Chicago.

• **J. J. Smith** has been appointed manager of the Schenectady plant of American Locomotive Co. following the promotion of W. L. Lentz. Mr. Smith has named two assistant managers: **David T. Coleman**, in charge of personnel, and **Walter C. Rockenstire**, in charge of manufacturing.

• **Harold J. McKay** has been appointed service engineer in the New York district for Janitrol gas-fired space heating equipment, Surface Combustion Corp., Toledo.

• **Mel B. Lindquist** has been named superintendent of labor relations for Ford Motor Co., Dearborn, Mich. Previously he had been director of purchases and the manager of industrial relations for Murray Corp. He succeeds **Stewart Evans**, resigned.

OBITUARY...

• **Henry T. Richardson**, 45, assistant manager of the Carnegie-Illinois Steel Corp. in St. Louis, died of a heart ailment Oct. 8.

• **Jesse F. Welborn**, 75, former president of Colorado Fuel & Iron Corp., died Sept. 30 following an illness of two years. Beginning as a bookkeeper for the company, he rose to the presidency in 1907. In 1929 he resigned from the presidency but became chairman of the board of directors until his retirement in 1931.

• **Howard W. Hosford**, 75, president of the Norwood Engineering Co., Florence, Mass., until he retired in 1941, and since then a director, died recently.

• **Alfred F. Wieland**, 55, formerly works manager of the Curtiss-Wright Corp. Airplane Div. plants in Buffalo from 1942 to 1944, died Sept. 25. Mr. Wieland, who retired last year because of ill health, had been with Curtiss since 1915.

• **Clarence F. Succop**, president and director of American Roller Bearing Co., Pittsburgh, died Oct. 4, after almost a year's illness.

CHATTER...CHATTER...CHATTER...
WAS RUINING FINISH

SUN TABLEWAY LUBRICANT...

Ended Chatter, Produced Smoother Operation, Cut Down Rejects

A midwestern manufacturer was unable to obtain a satisfactory finish in grinding hardened parts, because of excessive chatter in the grinding machines. When he used a heavy oil, the machines were sluggish. When he used a thin oil, the tableways chattered and affected the finish of the work.

After changing to Sun Tableway Lubricant, it was possible to maintain smoother operation, and to eliminate chattering.

Fewer rejects were encountered, and the management standardized on this Tableway Lubricant throughout the plant.

Sun Tableway Lubricant, with its extreme pressure characteristics and non-gumming qualities, is an outstanding example of Sun's industrial lubricants.

For every type, make, and size of industrial machine, for prime movers, conveyors, pumps, compressors, electrical equipment, etc., there is a specially prepared Sun oil or grease. Call in the Sun Engineer in your area and find out about the savings possible with the right lubricant in the right place.

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

Sponsors of the Sunoco News Voice of the Air — Lowell Thomas

SUNOCO **SUN INDUSTRIAL PRODUCTS**

OILS FOR AMERICAN INDUSTRY

Dear Editor:

NORTH-DRIFT, HEADLESS

Sir:

I shall be glad to hear if you can make me an offer, either direct or an intermediary, for a story which explains:

(1) Why the Churchill Government was forced out of office.

(2) Why the U. S. Government terminated lease-lend immediately and without notice.

(3) Why Mr. Churchill, as leader of the Opposition in the House of Commons, would not risk debate upon the termination of lease-lend when it was announced to the British Parliament.

The facts of this story have already been brought to no less than 27 dignitaries in this country, including His Majesty The King, The Archbishops of Canterbury, York and Westminster, the Lord Chancellor of England (House of Lords), Cabinet Ministers and many others, and the truth of this story is feared by both the Churchill and the present governments upon whom I have placed the onus to prove differently to public satisfaction. In effect those responsible have been outwitted and trapped in their own blackmail and falsification of figures. A Cabinet Minister also is accused of treason and rebellion for refusing to administer the orders of His Majesty's Privy Council (War-time Emergency Regulations).

Whilst the late Home Secretary (Mr. Herbert Morrison) told the press "The government will remain in office until the end of the war with Japan," I challenged and told him that if nothing was done it would lead to a national crisis. In consequence Mr. Morrison complained in the House "The Prime Minister is rushing the General Election" (without doubt for the obvious reason that a new government would be in office before these incredible and scandalous disclosures could become common knowledge). Furthermore, I have claimed justice in accordance with Magna Carta; I will not submit to blackmail and graft to conceal the truth; I will not surrender, nor will I subscribe to the Belsen motto "My Country Right or Wrong."

The story is in two parts. The first in the form of memorandum for compilation of a petition of right, sent to the Home Secretary on April 17, 1945, together with demands for arrests of sabotage, blackmail, treason and rebellion; and the second part dated Aug. 21, 1945, sent to His Majesty The King, Mr. C. R. Atlee (Prime Minister), Mr. Chuter Ede (Home Secretary) and Sir Stafford Cripps (president of the Board of Trade). The assistance of the U. S. Embassy, London, has been sought and they have acknowledged my appeal and so has the Embassy of the U. S. S. R.

My losses and claims approach £22,-000 and I offer these inside secrets to the American press for the highest price possible. If you can help me I promise the American public surprising and unbelievable sensations, and if you are interested, will you please advise me of your offer and to the method you suggest for both delivery and settlement.

In conclusion the whole affair relates to metal industry and to colossal misappropriations of metals from war stocks which has gone on with Ministerial knowledge in spite of annual reports in the years 1940, 1941, 1942, 1943, 1944 and 1945.

A. A. BAKER

North-drift
16, The Meadway, Headless Cross,
Redditch, Worcestershire

● Our interests are primarily in the making, treating and working of metals. We suggest offering your article to one of the financial journals or newspaper columnists.—Ed.

GERMAN CARBIDE INDUSTRY

Sir:

Please let us have five reprints of the article "German Cemented Carbide Industry" which appeared in the Aug. 30 issue. We enclose herewith 75¢.

L. FORCHHEIMER

Philipp Brothers, Inc.,
70 Pine St., New York 5

● Reprints have been mailed.—Ed.

ATOMIC BOMB

Sir:

The article in the Aug. 23 issue on "Atomic Bomb Sidelights" is so intensely interesting and educative that I should be pleased if you could send me a reprint.

H. C. BOYNTON
Consulting Metallurgist

John A. Roebling's Sons Co.,
Trenton 2, N. J.

● Reprints are available at 10¢ per copy. —Ed.

THE SUN NEVER SETS

Sir:

You may be interested to see what the natives on Beak, N. E. I., think of your family journal. The little job [picture above] seems to be against most everything. Due to the time lag in the mails, it takes three months for IRON AGE to get over here.

CAPT. JOHN G. NETT

IV ASAC, APO 920
San Francisco

● The mirth is the result of detection of an unfortunate formula error dealing with particle size of iron powder in that issue. The disdainful look registered by the introvert on the left is psychological sabotage—he's the Far East correspondent for one of our competitors.—Ed.

WHERE AND WHEN?

Sir:

On page 57 of the Aug. 23 issue appears the following item:

"The U. S. Steel Corp., Eastern plant, will probably be built in New Jersey and will include blast furnaces, openhearths, tinplate, bar, shape and sheet capacity."

I have seen no official announcement regarding such a plant. If anything further has appeared about it in THE IRON AGE, please send me a clipping.

C. E. WRIGHT
Vice-President

Charles Dreifus Co.,
Philadelphia 7

● Nothing official or additional yet available. Current broadening of basing point setup on most steel items is additional factor encouraging such new construction.—Ed.

These four major requirements of machine tool users were revealed in the survey made by the magazine "STEEL". Monarch turning machines hit them right on the nose, because these four, as well as many other expressed preferences, were already incorporated in the new and improved Monarch line.

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This Industrial Week . . .

- **Steel Loss to Top 300,000 Tons This Week**
- **Reconversion Dealt Blow by Coal Strikes**
- **Basing Point Expansion Now Under Way**

THE coal strike this week has become so serious that it has jammed on the brakes for reconversion to civilian manufacture. The steel industry will lose more than 300,000 tons of steel ingots this week because of enforced shutdowns due to lack of coal supplies. If the coal impasse continues into next week as now seems likely, total steel loss will approximate 393,000 tons for the industry as a whole.

Interpreted as finished steel product loss, steel consumers last week received about 125,000 tons less than they would have had it not been for the coal strike. This week total finished steel shipments may be off as much as 225,000 tons, an amount which, were it available, would contribute heavily to the production of cars, washing machines, refrigerators and other civilian appliances. Probable loss of finished steel products next week may approximate 250,000 tons.

While some of these losses may be made up in subsequent months, the time element because of necessary reconversion looms more important than any later attempt to make up for coal strike losses. Finishing mill operations have been affected along with steel ingot output reductions because supplies of raw steel ahead of the finishing mills have been at a low point for some time at many plants.

It may take months to straighten out the current chaotic delivery situation. Shipping schedules have been so badly disarranged that many steel companies find it impossible to make definite promises for future deliveries. Customers are being asked to cancel orders for tonnages in excess of the informal quotas set up by steel companies.

In some quarters there is evidence that steel users have not only attempted to build up inventories to speed reconversion, but at the same time were attempting to expand their stocks in view of the probability of higher steel prices later this year. The combination of the coal strike and the close scrutiny of all steel orders has tended to defeat to some extent this effort by consumers to obtain more steel than they actually need under present conditions.

The overall demand for steel is being obscured by factors tending to keep down the amount of business placed on order books, hence a reservoir of tonnage especially in the flat-rolled products group not yet accepted by the steel companies is building up rapidly. Despite this situation, producers are pushing sheet and strip mills to the maximum and orders for this type of product have shown no let down in the past few weeks.

•

ADDING to the confusion caused by the coal strikes were hearings last week between the U. S. Steel Corp. and the United Steel Workers of America when a $2-a-day increase in steel wage rates was demanded. The meetings were recessed to Oct. 23 at which time it is expected that the Corporation will refuse that demand and possibly counter with a compromise offer. Over the steel industry hangs the fear on the part of management and the union that during an attempt at wage negotiations more than ordinary labor disturbances may flare up in the steel industry.

Lack of coal this week has forced the steel ingot rate down nine points to 66.5 pct of rated capacity. Operations previous to the coal strike difficulties approximated 84 pct of capacity and represented a strong comeback following VJ-day. Hardest hit districts were Pittsburgh, operating at 47 pct this week, compared to 65 last week; Chicago at 73 pct, compared to 86 last week; Youngstown, 52 compared to 63; and Buffalo, 81½ compared to 99.

THE expansion of basing points for steel products other than stainless items predicted three weeks ago is now underway. Carnegie-Illinois Steel Corp. last week announced Youngstown as a basing point for hot-rolled carbon steel bars and small shapes, alloy hot-rolled bars and spring flats, alloy bar strip and alloy strip, all of which are made at the company's Youngstown plant but which were not heretofore base priced at Youngstown. The same company also named Chicago and Pittsburgh as basing points for spiegeleisen and Pittsburgh as a base for ferromanganese. It is expected that the U. S. Steel Corp. will continue, after study, to name more basing points and possibly eliminate others.

As soon as other steel companies have completed independent studies, it is expected that they too will revise their basing point setup with the likelihood that many more basing points will be added.

It is understood that when price adjustments are made on many steel products later this year they will include not only changes in the base price but revisions in some steel extras as well. The OPA for some time has been analyzing the steel extra setup (charges added to the base price for specific physical or chemical characteristics) in conjunction with the Steel Industry Advisory Committee for the purpose of establishing a more realistic approach to the cost factors involved.

Dimmed by the interest in coal and steel is the effect which recent labor disturbances have had upon nonferrous producers and their consumers. Fabricators orders on producers have been held up, and refinery production has been affected by strikes. Market reports indicate that cadmium, recently reported to be fairly well in balance, is now in short supply. With relaxed lead restrictions, lead is still in urgent demand with supplies extremely tight.

• **STEEL OUTPUT UP**—Steel production in September, the first full month after the end of the war, climbed back to a total of 6,008,403 tons, just 351 tons below the peak month of 1929, which still stands as the best peacetime year for steel production on record. September production, according to the American Iron & Steel Institute, rose nearly 5 pct over the August total of 5,736,376 tons. In September 1944, however, production was 7,235,111 tons. For the first nine months of this year production of 61,886,532 tons was more than 8 pct below output of 67,375,801 tons in the corresponding period in 1944. During September the steel industry operated at 76.6 pct of capacity, compared with 70.7 pct in August and 94.0 pct in September a year ago. An average of 1,403,832 tons of steel was produced per week during September, as against 1,294,893 tons per week in August and 1,690,446 tons per week in September 1944. October output is expected to show a decline because of forced shutdowns due to coal shortages.

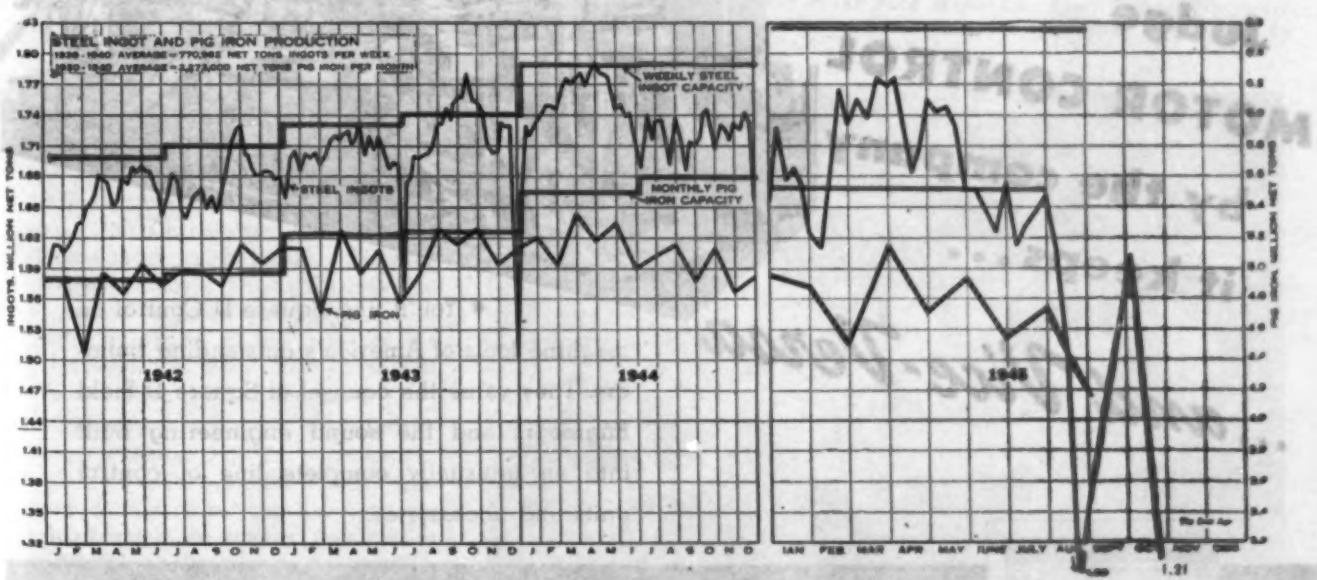
• **STEEL EMPLOYMENT DOWN**—Average employment in steel plants in August dropped nearly 15,000 below the July level, reflecting in part the end of the war, according to the American Iron & Steel Institute. During August, an average of 542,700 employees was at work in the industry, compared with 557,500 in July and with 569,200 in August 1944. Monthly payrolls likewise dropped during August to a total of $128,117,000 from the total of $141,006,400 in July. In August a year ago payrolls totaled $143,900,100. Hourly earnings of wage earners in August averaged 125.3c as against 126.9c in July and 116.9c in August of last year. Wage earners worked an average of 40.4 hr per week in August, compared with 43.5 hr per week in July and 47.5 hr per week in August 1944.

• **U. S. STEEL SHIPMENTS**—Shipments of finished steel products by subsidiary companies of the U. S. Steel Corp. for the month of September 1945 were 1,321,576 net tons. This compares with 1,332,180 net tons in the preceding month, a decrease of 10,604 net tons, and with 1,733,602 net tons in September 1944, a decrease of 412,026 net tons. Shipments for the first nine months of 1945 were 14,387,709 net tons compared with 15,864,466 net tons in the comparable period of 1944, a decrease of 1,476,757 net tons.

• **CANADIAN STEEL OUTPUT**—Despite heavy and persistent demand steel production in Canada continues to taper. For the month of August Canadian output fell to the lowest rate for the year, amounting to 224,928 net tons, or 74.9 pct of total rated capacity. This compares with 229,161 tons in July, the previous low month when the rate was 75.8 pct, and with 246,755 tons in August a year ago. Production for August included 214,930 tons of steel ingots and 9,998 tons of steel castings. For the eight months ending with August production of steel ingots and castings totaled 2,049,707 net tons, which compares with 1,993,756 tons in the same period of 1944 and 1,996,481 tons in 1943.

• **RAILROAD CAR NEWS**—Recent railroad awards and inquiries are as follows: Chicago, Burlington & Quincy Railroad has outlined a 1946 building program of 500 box, 500 auto box, 350 hoppers and 100 covered hoppers. Great Northern has placed 25 passenger cars with Pullman Standard at Chicago. Chilean State Railway has ordered 250 50-ton gondolas from Pressed Steel Car Co. Pennsylvania Railroad will build 70 coaches and 15 combination diner-and-buffet cars in its own shop. Atchison, Topeka & Santa Fe has ordered 250 70-ton covered hopper cars from General American Transportation Corp. Montour Railroad has awarded 200 50-ton hopper cars to Pullman Standard, and the Wheeling & Lake Erie Railroad has ordered six covered hopper cars from General American Transportation Corp. American Refrigerator Transit Co. will build 325 40-ton and 25 70-ton refrigerator cars in its own shop. St. Louis & San Francisco Railway has asked the Federal Court for authority to order: Three mail baggage cars, 11 chair cars, one chair lounge, one diner, 16 sleepers, two diner observation lounge cars, and one observation lounge car from Pullman Standard Car Mfg. Co.; three 4000 hp diesel electric locomotives from Electro-Motive Corp.; 300 50-ton automobile cars, 200 70-ton hopper ballast cars from American Car & Foundry Co.; and 100 70-ton hopper cars, 20 steel underframe cabooses to be built in the company's shops. Boston & Maine is in the market for 24 passenger cars including four lounge buffet cars.

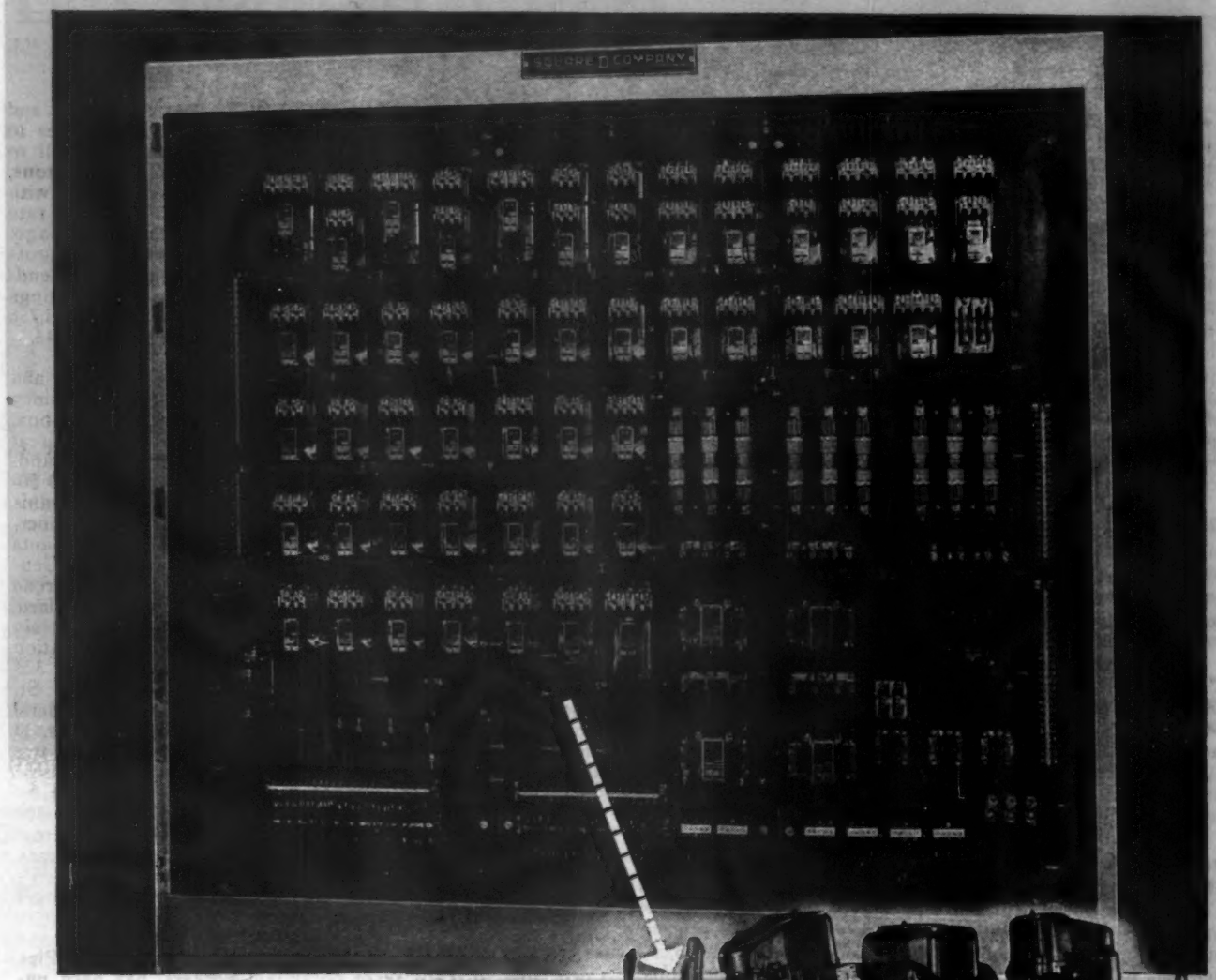
• **SIGN OF THE TIMES**—Warren Foundry & Pipe Corp., due to inability of obtaining workers, has been unable to step up production at its Everett, Mass. foundry, which is running three days a week. The company has been obliged to turn down business.

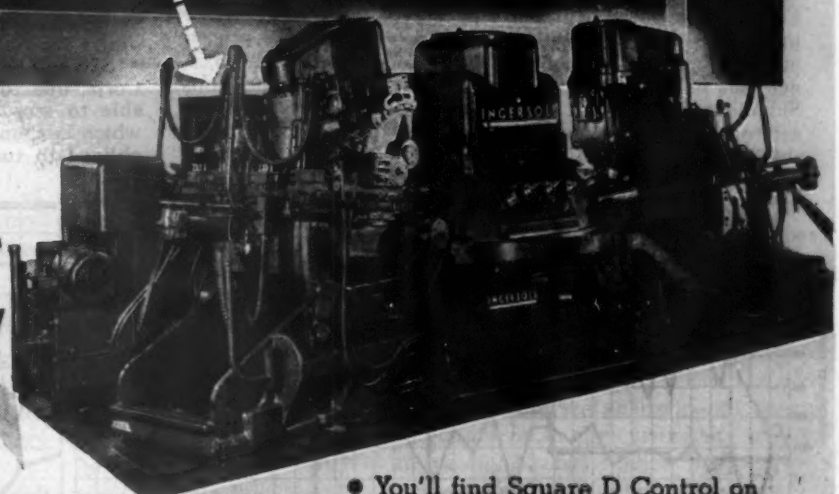


Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
October 9	65.0	86.0	63.0*	78.5	73.0*	89.0	72.0	95.0	93.5	82.0	84.0	67.5	85.0	76.5*
October 16	47.0	73.0	52.0	76.5	73.0	81.5	72.0	94.0	96.0	89.0	84.0	67.5	85.0	66.5

* Revised.





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Basing Point Expansion Now Underway for More Steel Items

Pittsburgh

• • • Just as it took the lead in establishing new basing points for stainless steel products a month ago, the U. S. Steel Corp. through its subsidiary Carnegie-Illinois Steel Corp. has begun naming new basing points for other steel items. (See THE IRON AGE, Sept. 13, p. 99, Sept. 20, p. 109, Sept. 27, p. 95 and Oct. 4, p. 120 for other discussions of the whole forthcoming basing point changes.)

Effective Oct. 13, Carnegie-Illinois established the basing point at Youngstown for hot-rolled carbon steel bars and small shapes within the range of sizes, grades and finishes produced by the company in that area.

It also announced Youngstown as a basing point for alloy hot-rolled bars and spring steel flats, alloy bar strip and alloy strip. The base price for hot-rolled bars and small shapes will be the same as at other major centers, 2.25¢ per lb f.o.b. Youngstown.

Alloy hot-rolled bars and spring steel flats are priced at 2.70¢ per lb f.o.b. Youngstown and the same price applies to bar strip. Regular strip other than bar strip in alloy grades is priced at 4.70¢ per lb f.o.b. Youngstown.

Carrying out further its expansion of basing points so that locations where a product is made reflect a basing point price, Carnegie-Illinois effective Oct. 13 established Pittsburgh and Chicago as basing points for spiegeleisen (19-21 pct manganese). The price is $40 a gross ton f.o.b. Pittsburgh and Chicago. In all cases the Corporation quotes a delivered price which includes the area switching charge. This is not reflected in the above prices but amounts to a switching charge of $50 a ton in the Pittsburgh and Youngstown area and $60 a ton in the Chicago area.

Carnegie-Illinois also made Pittsburgh a basing point for ferromanganese with f.o.b. price $139.50 at Pittsburg. It is expected that the Corporation through its various subsidiaries will continue the process of expanding basing points for other products which do not now have a basing point at point of manufacture.

The trade also expects that steel companies other than U. S. Steel will soon follow the same procedure in view of the recent Supreme Court decision outlawing single basing points when products were made at more than one location. It is known that some companies have independently studied their situation and will soon make announcements.

Steel Firms Expected To Reject $2 Increase

Pittsburgh

• • • Following in the same tracks as the U. S. Steel Corp., with regard to wage increases demanded by the CIO-USWA, the major steel producers that have met with the CIO to date have recessed the meetings until Oct. 23 or later. Among the companies postponing the hearings are Jones & Laughlin Steel Corp., Republic Steel Corp., Allegheny-Ludlum Steel Corp., and others.

Speculation among informed observers here indicate that the corporation will turn down the union request for a $2 a day increase in base labor rates, but offer a compromise of something close to $1. While this gossip in the trade has neither the benefit of official word from U. S. Steel nor the authenticity that might be acquired from opinions of top officials of the company, it is pretty much the general opinion of a considerable number of people in the industry.

Further, it is believed that the union itself does not expect immediate acceptance of the $2 a day demand, but does hold to the belief that such a demand can be forced upon the industry. This, of course, may lead to a steel strike, but neither the industry nor the union wants to think too loudly about this possibility at the present time.

Steel producers emphasize the fact that the industry is in no position financially to grant such a demand. On the other side, Philip Murray began a series of four radio broadcasts on Monday evening, Oct. 15, on the plight of the steel workers, the economics of the industry, and other factors furthering the unions claim that a wage increase right now is both needed and possible.

Ledloy Extras Increased

Chicago

• • • Increased extras have been granted Inland Steel Co. by the OPA on Ledloy Steel. Extras over carbon grades on billets and slabs have been raised from $2.00 to $5.00 per gross ton, on bars from 10¢ to 25¢ per 100 lb and on plates from 20¢ to 35¢ per 100 lb.

BACK TO WORK: *Employees of the Ford Motor Co., River Rouge plant, work on the assembly line of 1946 model passenger cars after being halted twice by strikes in feeder plants.*

Coal Situation Chaotic; Steel Production Slashed to New Low Level

Pittsburgh

• • • **Steel production** in the Pittsburgh and western Pennsylvania areas plummeted this week as subsidiaries of the U. S. Steel Corp., slashed operating rates to new low levels and Jones & Laughlin Steel Corp., reduced its operations about 15 pct. Only 7½ blast furnaces of the corporation's 29 were in operation on Tuesday, and 53 of 127 openhearths in the area were operating.

By Tuesday, Clairton Works of Carnegie-Illinois Steel Corp., was only operating 25 pct at its coke plant, while its steelmaking operations and finishing production was shut down completely. Clairton blast furnace operations were sharply reduced. At Carnegie's Duquesne Works, all operations were shut down Monday night, including the six blast furnaces. Edgar Thomson Works had two blast furnaces in operation, and the 44-in. slabbing mill, but all openhearth and other finishing capacity was shut down. At Homestead, eight of the new DPC openhearths, one blast furnace, and the 45-in. slabbing mill were in production, while the remainder of this huge plant was closed down.

The two Isabella furnaces are in blast on ferromanganese, and the Irwin and Vandergrift plants, both flat-rolled finishing plants, are working normally.

National Tube Co., reports normal pipe production at both Lorain, Ohio, and National Works, McKeesport, but four of the company's seven blast furnaces are off. Bessemer and openhearth steel production have been reduced sharply. The Donora plant of American Steel & Wire Co., is working at normal this week, following a 6-day strike that tied up production of the entire plant. The strike, which started Oct. 8, was caused by five men at a wire normalizing furnace requesting tonnage rates rather than hourly rates.

The steel loss of the Carnegie-Illinois Steel Corp. alone is estimated at over 100,000 tons a week, and approximately 10,000 employees in Carnegie plants have been forced out of work. Many others are on greatly reduced work schedules.

Jones & Laughlin Steel Corp., while not shutting down any of its plants, has reduced steel producing operations from 80 pct to 68 pct. This is still a comparatively high operating rate for a major steel producer in this district, and it is not known at this time how long the company will be able to maintain these operations.

•

Youngstown

• • • **Steel production** was due for another drop here as the Carnegie-Illinois Steel Corp. banked three blast furnaces and suspended four openhearths at Ohio Works leaving only two blast furnaces and nine openhearths active in the Youngstown district's biggest steel plant.

All but four rolling mills at McDonald Works were being shut down, along with the Bessemer at Ohio Works, which was shut down as soon as the hot metal in the mixer was worked out.

These curtailments were responsible for the temporary unemployment of more than 4000 men, and many other thousands already are out of work, or working on reduced schedules in district steel plants for the same reason.

Some 1800 workers were affected when Carnegie-Illinois' Farrell works closed down recently. It had been operating nine openhearths and one blast furnace.

•

Buffalo

• • • **Diminishing coal** supplies forced a sharp reduction in iron and steel output here this week. The ingot rate slumped 17½ points to 81½ pct and two blast furnaces were banked.

Bethlehem's Lackawanna plant bore the brunt of the blow, with six of 26 active openhearths shut down and one of five active blast furnaces banked.

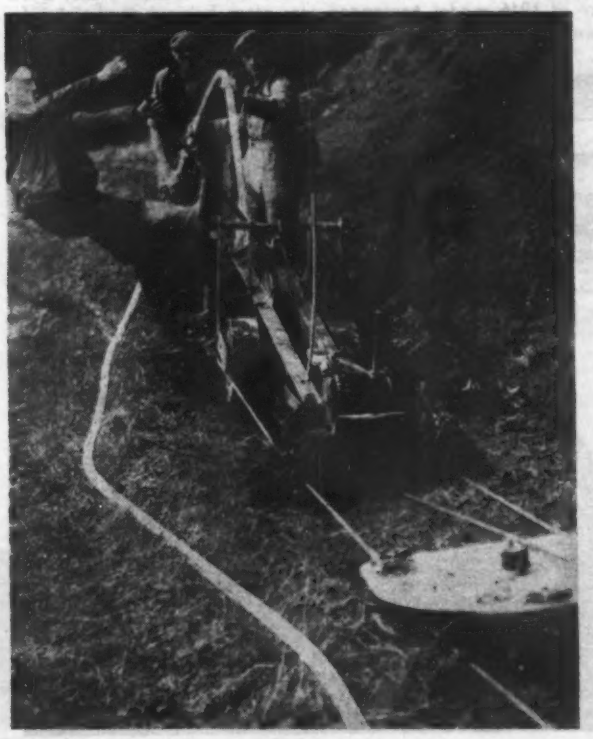
With coal on hand for only three weeks operations at the reduced rate, Lackawanna plant workers were put on a 40-hr week, compared with as high as 70 hr in some instances heretofore. All finishing departments except the strip mill went from a 6-day to a 4-day schedule effective Oct. 15.

Bethlehem also shut down 112 coke ovens, cutting production from 6000 to 3100 tons a day. The loss in steel production was estimated at 4000 tons daily.

Hanna Furnace banked one of three active blast furnaces and a spokesman said future operations depended on success in obtaining additional coke supplies.

Wickwire Spencer's River Road plant is expected to shut down its three active openhearths by the end of this week. Enough rods have been accumulated to keep the wire mill going for a week after raw steel output is halted.

Republic Steel operations were un-



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PLUTO PLOUGH: *Developed from Pluto, the oil pipelines laid across the English Channel, is a special cable-laying plough drawn by a 60 hp diesel winch, which lays down the cable in short order.*

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changed in production. A company spokesman said the plant had coke booked ahead in addition to a small reserve stock.

Plants at the Donner Hanna Coke Corp. and Semet-Solvay Co. were reported at about 80 pct of capacity.

•

Cleveland

• • • **Another phase** in the paralysis of iron and steel production was in the offing this week as coal stocks at Lake Erie ports continued to diminish as a result of the coal strike.

According to the Ore and Coal Exchange, stocks were at the lowest point since the season opened last spring. At one time, only 13,500 cars of bituminous coal were available for loading lake ships, about 10,000 cars below the amount required for continuous loading. Last week's loadings into lake ships were estimated at about 1,500,000 tons, and Exchange officials said they expect a heavy drop in all lake shipments of coal until the end of the coal strike.

This season's total for coal loaded into lake ships from Lake Erie ports is now more than 4,000,000 tons behind the corresponding period a year ago. Few straight cargoes are available and a good deal of car switching is necessary to assemble the mixed loads.

Faced with the threat of a slowdown, Great Lakes ships loaded 2,163,424 gross tons of iron ore at Upper Lake ports last week, raising the season's total sent down to 63,925,221 tons, it was reported here. Shipments for the corresponding period a year ago were reported at 68,523,297 gross tons.

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Pittsburgh

• • • **A threat** of long range if not permanent damage to Jones & Laughlin Steel Corp.'s coal mines occurred last week when pickets at the three Vesta mines and the Shannopin mine refused to let mine pumpers through the picket lines to their jobs. This action by the pickets may result in the flooding of these mines, which will mean that two to three months will be required to de-water them and another 8 to 19 weeks to get the machinery and motors back into working condition.

Pumpers were out at the three Vesta mines, Nos. 4, 5 and 6, on Thursday, and by Monday pumpers at all the mines were out. The pumps have been manned at these mines on a 24 hr shift basis by the mine foreman and the superintendent since the pumpers have been refused entrance to the mines. It is only a question of time, however, until the water gets ahead of the pumps and serious, if not permanent, damage results.

•

Chicago

• • • **Dwindling coking** coal supplies cut Chicago district steelmaking operations 13 points this week—Oct. 16—to 73 pct and made even deeper inroads on pig iron and coke production. Carnegie-Illinois continued its program of banking one blast furnace daily which will be followed, if the strike continues, until only two are active at Gary Works and two at South Works. Carnegie estimates that it will lose 63,000 tons of pig iron and 53,000 tons of steel in the district by the end of this week.

At the Joliet Plant of American Steel & Wire Co. one coke battery was taken out of production last week, with two scheduled to go down this week, leaving one on extended time.

Of the 13 active coke batteries at Gary, six were slated to go down this week, Oct. 16, leaving seven on extended time. The equivalent of two full openhearth shops at Gary and South Works, combined, were to be down by the end of this week.

Virtually all rolling mills at both plants are affected, and all departments are operating on a 4-day week, because of labor shortage, all displaced men have been offered transfers to other departments. By the end of this week, operations at the Carnegie plants will be on the lowest level since 1938.

Inland Steel Co. removed another blast furnace this week in addition to two taken off last week at Indiana Harbor. Steelmaking operations have dropped correspondingly.

Youngstown Sheet & Tube Co. removed one blast furnace Oct. 13. At South Chicago and one Oct. 14 at Indiana Harbor. Steelmaking has not yet been affected by the coal strike.

Coke production at the South Chicago works of Republic Steel Corp. has cut coke production approximately 50 pct through slow cycle operations. Ironmaking operations will not be affected until the latter part of the week of Oct. 1.

YEAR 1945

Based on Reports by Companies which in 1944 made 97.9% of the Open Hearth, 100% of the Bessemer and 96.7% of the Electric Ingot and Steel for Castings Production

Period	Estimated Production—All Companies								Calculated weekly production, all companies (Net tons)	Number of weeks in period
	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL			
	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity		
January	6,468,815	90.5	379,062	76.0	358,346	77.3	7,206,223	88.8	1,626,687	4.43
February	5,967,842	92.4	347,227	77.1	339,520	81.1	6,654,589	90.8	1,563,647	4.00
March	6,927,377	96.9	398,351	79.8	382,237	82.4	7,707,965	95.0	1,739,947	4.43
1st Quarter	*19,364,034*	*93.3*	*1,124,640*	*77.6*	*1,080,103*	*80.2*	*21,568,777*	*91.6*	*1,677,199*	*12.86*
April	6,541,097	94.4	372,952	77.2	377,877	84.1	7,291,926	92.8	1,696,750	4.30
May	6,663,577	93.2	402,100	80.6	386,075	83.3	7,451,752	91.8	1,682,111	4.43
June	6,129,266	88.5	379,807	78.6	333,217	74.2	6,842,290	87.1	1,594,939	4.29
2nd Quarter	*19,333,940*	*92.1*	*1,154,859*	*78.8*	*1,097,169*	*80.6*	*21,585,968*	*90.6*	*1,659,183*	*13.01*
1st 6 Months	*38,697,974*	*92.7*	*2,279,499*	*78.2*	*2,177,272*	*80.4*	*43,154,745*	*91.1*	*1,668,139*	*25.87*
July	6,318,463	88.6	381,832	76.7	286,713	61.9	6,987,008	86.3	1,580,771	4.42
*August	5,171,925	72.3	347,088	69.5	217,363	46.9	5,736,376	70.7	1,294,893	4.43
†September	5,458,130	79.0	352,584	73.2	197,389	44.1	6,008,403	76.6	1,403,832	4.28
3rd Quarter	*16,948,518*	*80.0*	*1,081,804*	*73.1*	*701,465*	*51.1*	*18,731,787*	*77.9*	*1,426,640*	*13.13*
9 months	*55,646,492*	*88.4*	*3,361,303*	*76.5*	*2,878,737*	*70.5*	*61,886,532*	*86.6*	*1,586,834*	*39.00*
October										4.43
November										4.29
December										4.42
4th Quarter										*13.14*
2nd 6 months										*26.27*
Total										52.14

Note—The percentages of capacity operated are calculated on weekly capacities of 1,419,120 net tons open hearth, 118,680 net tons Bessemer and 104,040 net tons electric ingots and steel for castings, total 1,521,840 net tons; based on annual capacities as of January 1, 1945 as follows: Open hearth 74,471,280 net tons, Bessemer 5,574,960 net tons, Electric 5,455,980 net tons.

* Revised.
† Preliminary figure, subject to revision.

YEAR 1944

Based on Reports by Companies which in 1944 made 97.9% of the Open Hearth, 100% of the Bessemer and 96.7% of the Electric Ingot and Steel for Castings Production

Period	Estimated Production—All Companies								Calculated weekly production, all companies (Net tons)	Number of weeks in period
	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL			
	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity		
January	6,770,423	97.2	439,551	85.4	382,629	84.4	7,592,603	95.7	1,713,906	4.43
February	6,410,914	98.5	409,781	85.2	373,314	88.1	7,194,009	97.0	1,737,683	4.14
March	6,977,466	100.1	455,368	88.5	393,423	86.8	7,826,257	98.6	1,766,649	4.43
1st Quarter	*20,158,803*	*98.6*	*1,304,700*	*86.4*	*1,149,366*	*86.4*	*22,612,869*	*97.1*	*1,739,451*	*13.00*
April	6,789,422	100.6	437,472	87.8	366,794	83.8	7,593,688	98.8	1,770,090	4.29
May	6,879,253	98.7	437,444	85.0	385,879	85.1	7,702,576	97.1	1,738,730	4.43
June	6,463,049	95.8	419,609	84.2	351,509	80.1	7,234,257	94.1	1,686,307	4.29
2nd Quarter	*20,131,724*	*98.4*	*1,294,615*	*85.6*	*1,104,182*	*82.9*	*22,530,521*	*96.7*	*1,731,785*	*13.01*
1st 6 months	*40,290,527*	*98.5*	*2,599,315*	*86.0*	*2,253,548*	*84.7*	*45,143,390*	*96.9*	*1,735,617*	*26.01*
July	6,743,812	96.6	415,543	80.9	339,032	74.6	7,498,387	94.3	1,696,468	4.42
August	6,715,835	95.9	429,672	83.5	353,406	77.6	7,498,913	94.1	1,692,757	4.43
September	6,501,944	96.1	398,058	80.1	335,109	76.3	7,235,111	94.0	1,698,446	4.28
3rd Quarter	*19,961,591*	*96.2*	*1,243,273*	*81.5*	*1,027,547*	*76.2*	*22,232,411*	*94.1*	*1,695,353*	*13.13*
9 months	*60,252,118*	*97.7*	*3,842,588*	*84.5*	*3,281,095*	*81.8*	*67,375,801*	*96.0*	*1,731,495*	*39.14*
October	6,860,921	98.0	420,105	81.6	339,859	74.7	7,620,885	95.9	1,720,390	4.43
November	6,572,454	97.0	403,908	81.0	302,157	68.6	7,278,719	94.3	1,696,671	4.29
December	6,678,460	95.6	372,372	72.7	314,388	69.2	7,365,170	92.6	1,666,554	4.42
4th Quarter	*20,111,835*	*96.9*	*1,197,335*	*78.6*	*956,604*	*70.8*	*22,265,774*	*94.2*	*1,694,503*	*13.14*
2nd 6 months	*40,073,426*	*96.5*	*2,440,668*	*80.0*	*1,984,151*	*73.5*	*44,498,185*	*94.2*	*1,693,878*	*26.27*
Total	80,363,953	97.5	5,039,923	83.0	4,237,699	79.0	89,641,575	95.5	1,714,644	52.28

Note—The percentages of capacity operated are calculated on weekly capacities of 1,377,735 net tons open hearth, 118,680 net tons Bessemer and 102,960 net tons electric ingots and steel for castings, total 1,599,375 net tons; based on annual capacities as of Jan. 1, 1944 as follows: Open hearth 71,733,840 net tons, Bessemer 5,574,960 net tons, Electric 5,330,880 net tons. Beginning July 1, 1944, the percentages of capacity operated are calculated on weekly capacities of 1,500,885 net tons open hearth, 118,680 net tons Bessemer and 102,960 net tons electric ingots and steel for castings, total 1,702,525 net tons; based on annual capacities as follows: Open hearth 78,046,980 net tons, Bessemer 5,574,960 net tons, Electric 5,377,120 net tons.

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Steel Mill Supplies Receiving Foreign, Replacement Orders

Pittsburgh

• • • **Producers of capital equipment for steel mills are looking forward to a pretty good 12-month period next year, because already they have received a substantial number of inquiries from steel mills. Further, foreign interest is active, and even though the full impact of foreign buying has not been felt, there is considerable activity among foreign steel producers for expansion of steel and iron making capacity.**

One domestic steel producer has already asked for detailed plans for additional steelmaking capacity at one of its plants. These additions will include about eight openhearths, some bessemer capacity, mixers, and the normal auxiliary equipment needed to service such fundamental additions.

Further, a new tool steel plant is being engineered for Brazil. It will be completely integrated, having both ironmaking and electric steelmaking capacity. This plant is being engineered by an American firm, and it is believed will be near the new plants of the National Steel Co. of Brazil. (See THE IRON AGE, July 5, p. 108.) The fact that much of the railroad equipment is identical to that of the National Steel Co. of Brazil indicates that, because of unusual clearances, the ore sources of the new company will be the same as those of the government-subsidized steel plant and the new plants will be close together.

Replacement business is expected to pick up as quickly as the steel industry gets its present labor difficulties cleared out of the way. Much of the capital equipment in steel mills has been worked ragged during the past four years with very little maintenance and less replacement. This equipment will in many instances be replaced by new machinery.

Expand Buttweld Pipe Facilities at Lorain

Pittsburgh

• • • **Plans to improve production facilities for manufacture of buttweld pipe to meet postwar demands at Lorain Works of National Tube Co.** were announced today by C. R. Cox, president.

The Lorain project, designed to improve production methods and to meet requirements of new housing construction, is a part of a long-range modernization and improvement program begun before the war by subsidiary companies of United States Steel.

"Under the program, production of standard pipe in buttweld sizes, 3 in. and smaller, by National Tube would be concentrated at Lorain Works. Improvements announced recently which will increase the efficiency of Lorain buttweld mills and related facilities, are expected to be completed during 1946," Mr. Cox said, adding that "further development of these operations is already under consideration."

Price Control For Stainless Steel Suspended by OPA

Washington

• • • **Price control on stainless steels has been suspended effective Oct. 16. This OPA action which has been expected for some time (THE IRON AGE, Sept. 6, p. 121) was taken through issuance of Amendment 2 to Special Order 129.**

The amendment also suspended price controls on tool steel scrap, nonferrous forgings, lead bullet rod, calcium metal ferroboron, ferrophosphorous and other boron alloys.

There is no likelihood of an increase in the level of prices of stainless steel as a result of the suspension, OPA pointed out, inasmuch as the expected peacetime demand is far below the industry's productive capacity.

Furthermore, OPA explained, the recent changes in basing points will have the effect of reducing the delivered prices for stainless steels in most areas below the level prevailing during the war.

Mechanical building equipment, including metal awnings, mail chutes, metal flag poles, vault doors and plastic pipes and fittings were also suspended from price control.

Price controls over machinery used in the process of making springs were also suspended by OPA. This amendment, it was pointed out, corrected coverage to exclude wire forming machinery from the list of machine tools previously suspended from price control.

Also, radio tubes, parts and storage batteries supplied to other manufacturers or assemblers who are brand owners for replacement purposes were exempted from price control.

To Discuss Postwar Problems

New York

• • • **The American Institute of Steel Construction will discuss immediate postwar problems at the institute's Convention to be held at French Lick Springs Hotel, French Lick, Ind., on Oct. 29, 30, 31 and Nov. 1, according to Robert T. Brooks, executive vice president announced.**

Prominent on the list of speakers will be Paul Coddington of Detroit, president of the institute; ex-Congressman Samuel B. Pettengill, Albert E. Meder, labor relations expert of Detroit; O. Kline Fulmer, architect and city planner who helped prepare the "Toledo Plant."

COMING EVENTS

Oct. 23-24, 1945—Seventeenth Annual Convention of the Gray Iron Founders' Society, La Salle Hotel, Chicago.

Oct. 24—Annual Meeting, Porcelain Enamel Institute, William Penn Hotel, Pittsburgh.

Oct. 24-25—1945 Annual Convention, Machinery Dealers National Assn., Congress Hotel, Chicago.

Oct. 24-25—Fall Convention, National Assn. of Waste Material Dealers, Inc., Chicago.

Nov. 6-7—SAE National Fuels & Lubricants Meeting, Mayo Hotel, Tulsa, Okla.

No. 16-17—Forty-Sixth Annual Convention, National Metal Trades Assn., Hotel Cleveland, Cleveland.

Dec. 3-5—SAE National Air Transport Engineering Meeting, Edgewater Beach Hotel, Chicago.

Jan. 7-11, 1946—SAE Annual Meeting and Engineering Display, Book-Cadillac Hotel, Detroit.

Jan. 21-23—1946 Convention of Institute of Scrap Iron & Steel, Inc., Congress Hotel, Chicago.

Feb. 4-8—National Metal Exposition, Public Auditorium, Cleveland.

Feb. 4-8—National Metal Congress, Public Auditorium, Cleveland.

Feb. 4-8—American Society for Metals, Statler Hotel, Cleveland.

Feb. 4-7—National Meeting, American Welding Society, Hotel Cleveland, Cleveland.

Feb. 4-8—National Meeting, Iron and Steel and Institute of Metals Div., American Institute of Mining and Metallurgical Engineers, Statler Hotel, Cleveland.

Feb. 6-8—American Industrial Radium and X-ray Society, Hollenden Hotel, Cleveland.

New Stainless Producer To Produce Sheet And Strip on Cluster Mill

Washington, Pa.

• • • Formation of the Washington Steel Corp., a new company that will produce stainless steel in both sheet and strip form, was announced here Oct. 9. T. S. Fitch, formerly manager of the Composite Steels Division of the Jessop Steel Co., Washington, Pa., is president, and F. G. Gerard, formerly plant superintendent of the Eastern Rolling Mill Co., Baltimore, is vice-president in charge of operations. During the war Mr. Fitch was a special assistant in the Steel Division of the War Production Board.

The new corporation has purchased the plant and facilities formerly owned by the Washington Tin Plate Co. and will install new machinery to handle stainless steel. The company will specialize in the production of stainless steel strip and sheet in the gage range of 0.004 in. to 0.078 in. and up to 36 in. in width.

Besides Mr. Fitch and Mr. Gerard, other members of the board of directors are E. L. Parker, president, Columbia Steel and Shafting Co., Pittsburgh; W. F. Crawford, president, Edward Valve & Mfg. Co., Chicago; G. E. Diamond, former comptroller of the Jessop Steel Co.; J. H. Davidson, Washington, Pa., attorney; Henry Hood, partner of Henry G. Hood and Sons, Washington; J. B. Warden, vice-president and trust officer, First National Bank at Pittsburgh; and Guy Woodward, Washington.

A new and improved type of cold-rolling mill, a 39-in. cluster type, will be installed in the plant. This mill will make it possible to produce a more uniform strip with a higher strength-to-weight ratio than is available at the present time. Stainless steel cold-rolled by strip practice is said to be more uniform and to have a superior surface to sheets rolled individually. The mill is designed to eliminate flexing of the rolls by a system of multiple-backing rolls and bearings within a solid housing. This feature permits equal pressure to be exerted along the entire length of the work rolls, thus producing a more uniform product. The rolls function in a bath of oil, which is filtered and cooled, so that frictional heat is dissipated and uniform temperature can be maintained.

Except for such standard facilities as cranes, the plant will be completely equipped with new and improved machinery. It will be one of the very few plants in the country designed and laid out specifically for the production of stainless steel.

The J. G. White Engineering Corp., New York, reported in a survey conducted for the corporation that "stainless steel products and consumption are in the early stages of a growing industry. Within the near future, expansion of existing stainless steel rolling mill facilities will probably be required."

From the actual increase in the use of stainless steel from 1939 to the present, and an estimate for the next two years, the survey showed that industry will use over one-third more of the alloy by 1947 than it did in 1939.

American Bridge Plans Changes at Gary Plant

Pittsburgh

• • • Broad plans for modernization of the Gary, Ind., plant of the American Bridge Co. to meet increasing demands for fabricated steel in mid-western and western states were announced by L. A. Paddock, president of this U. S. Steel Corp. subsidiary. The modernization project is a part of a long-range program begun during the prewar years by subsidiary companies of U. S. Steel.

The Gary plant of American Bridge which is adjacent to the Gary works of Carnegie-Illinois Steel Corp., was built in 1911. During the war the plant built aircraft carrier sub-assemblies and radar equipment for the Navy and earth moving equipment. In peacetime, the plant will turn out structural steel for all types of steel construction.

Output of the Gary plant of American Bridge is expected to be substantially increased by the changes which are planned, Mr. Paddock said. Working area of the plant will be increased by nearly 10 pct, and rearrangement of fabricating facilities and production equipment, increase and centralization of the welding area, enlargement of the under-roof painting area and relocation and combination of certain service facilities are designed to improve postwar operations and service to customers.

British Steel Costs

London

• • • The most serious factors in domestic costs of steel are the price of fuel and the level of wages, according to Mr. Fred Clements, in a speech at the annual general meeting of Park Gate Iron & Steel Co., Ltd. "In 1939 the price of coal was $4.15 per ton and of coke $4.62 per ton. Today these figures are $8.34 per ton and $11.36 per ton respectively, being an increase of 100 pct on coal and 140 pct on coke. (Conversion based on pound Sterling at $4.02.) Fuel economy has always been a matter for serious regard at Park Gate and it is difficult to see how any substantial improvement can be made. On the average we use about 1960 lb of coal and 1848 lb of coke per ton of finished steel, consumptions which would compare favorably with steelworks' practice generally. Again, the price of fuel affects the production cost of practically every commodity and service available today, and therefore the repercussions of it are felt indirectly in the prices charged for these, and consequently in the cost of the many materials used in a steelworks. It is at once evident that cheaper steel with increasing fuel prices is not feasible, a truth which will have to be realized even by the manufacturers of motorcars.

"The influence of labor rates can best be illustrated by stating facts. In 1945 the average earnings per employee were $25.75 per week, the increase since 1939 being 51 pct. During the year the amount paid in wages was $4,448,231. Your directors are no advocates for low wages—indeed, they are in favor of giving adequate remuneration for work done. It cannot be emphasized too strongly, however, that higher wages are only compatible with higher outputs—indeed, neither nationalisation nor any other panacea for all industrial ills can alter that simple but quite fundamental fact.

"It applies not to the iron and steel industry alone but to all industries without exception. There is abroad today now the fighting in the European War is over, an impression that an era of higher wages for less work has commenced. This is unfortunate, for, if persisted in, it will lead to unpleasant disillusionment in the not distant future."

Gray Iron Founders Map Plans for Chicago Convention This Week

Cleveland

• • • **Manufacturers of gray iron castings will map definite action on their manpower and price ceiling problems and chart a realistic program for quick realization of the capacity-level output required by peacetime demands at the 17th annual convention and Peacetime Production Conference of the Gray Iron Founders' Society to be held in Chicago, Oct. 23 and 24, at the LaSalle Hotel.**

At the luncheon session on Oct. 23, Lt. Col. John Lansdale, Jr., will reveal how the United States guarded its best kept secret, the atom bomb, and kept tab on the atom-smashing progress of Germany and Japan. There will also be a presentation of the Society's Tribute of Appreciation awards to Edward P. Buchanan of the Pittsburgh Coke & Chemical Co., Pittsburgh; A. Douglas Hannah, chief, Forgings & Castings Branch, Steel Div., WPB, Edward C. Hoenicke, assistant to the general manager, Foundry Div., Eaton Manufacturing Co., Detroit; William Kerber, assistant to the president, Hanna Furnace Corp., Buffalo; Frank G. Steinebach, editor of *The Foundry*, and Donald J. Reese, head of the Iron and Nonferrous Castings Section, Development and Research Div., International Nickel Co., Inc., New York City.

Scheduled for the opening session are the president's annual address; a discussion of foundry research by Howard F. Taylor of the Naval Research Laboratory, Washington; a talk by H. C. Nicholas, vice president of the Quality Castings Co., Orrville, Ohio, on "The Economics of Sound Costing," and an address by Brig. Gen. D. Armstrong of Washington, commandant of the Army Industrial College, titled "Industry and the Armed Forces in Peace."

The opening session will also hear a special announcement by Edward L. Roth, president, Motor Castings Co., Milwaukee, and chairman of the society's technical committee; and short discussions by L. V. Wickson, production manager, Almont Manufacturing Co., Inlay City, Mich., and Howard A. Stockwell, treasurer, Barbour Stockwell Co., Cambridge, Mass.

An industrial relations panel session Tuesday afternoon will feature E. M. Cushing of New York City, labor relations supervisor for United States Rubber Co.; Dr. James E. Mullen, Toledo, Ohio, physician and surgeon, whose subject is "Hot, Heavy and Healthy"; Eric E. Schwantes, director of training, McCormick Works, International Harvester Co., Chicago, who will outline "Personnel Policies for Gray Iron Foundries", and Frank O'Malley, personnel director, The Ferro Machine & Foundry Co., Cleveland, who will describe "A Practical Approach to Re-employment of Veterans." Wallace O. Leonard, president, Wilson Foundry & Machine Co., Pontiac, will act as chairman.

Phases of the problem of increasing gray iron castings output sharply will again be explored at the Wednesday morning session when Max Kuniansky, vice president, Lynchburg Co., Lynchburg, Va.; John E. Linabury, foundry engineer on the manufacturing staff of General Motors Corp., and C. W. Schwenn, plant superintendent, Brillion Iron Works, Inc., Brillion, Wis., will be featured speakers. Subjects to be covered in that session are "Quality Control", "Plant Conditioning for Increased Production", and "Production Control for Cost Reduction."

Expect 9.5 Million Ton Iron Foundry Output

Cleveland

• • • **Blaming a lack of manpower and the Office of Price Administration, W. L. Seelbach, president of the Gray Iron Founders Society, Inc., and secretary-treasurer of Forest City Foundries Co., asserted this week that the industry should be producing 16,000,000 tons of castings this year, but actually will be able to produce only 9,500,000.**

"People who have been laid off are evidently not in a hurry to get new jobs, and the United States Employment Service does not seem able to send foundries the type of men they need," he added.

"OPA has limited us to a 4 pct profit before taxes. This has curtailed production and discouraged new venture capital. Production costs in foundries are up 20 to 25 pct, not including any prospective labor cost increase."

Foundrymen say they are paying good wages but still cannot get manpower enough to handle even 75 pct of the work done at the outbreak of the war. One foundry superintendent said that two men, who had each been averaging 120 hr a week for 26 weeks during the war, had walked off the job because, when they switched to peacetime production they considered the making of the new castings "too hard work."

EISENHOWER EXPRESS: ***Grammar schoolboys at Marylebone Station, London, show interest in the first L.N.E.R. streamlined Pacific locomotive to be repainted in the prewar garter blue livery—christened "Dwight D. Eisenhower."***

Tool Maker Set To Produce Pumps And Textile Machinery

Cleveland

• • • A quarter-million-dollar expansion program and the formation of a new division for the design, development and manufacture of aircraft and automotive pumps has been announced by A. W. Hecker, head of the A. W. Hecker Co.

At the same time, it was learned that the company has a knitting machine, containing some 4500 working parts which promises to be an innovation in textile machinery, scheduled for production the first of the year. The company is the second Cleveland concern to make a postwar entry into the textile machinery field; some weeks ago the Warner & Swasey Co. announced plans for the manufacture of a knitting machine.

"A survey has indicated that improvements could be made in the design and materials used in the construction of pumps," Mr. Hecker said, in announcing formation of the new pump division.

"Our equipment lends itself very well to the manufacture of such a unit. This brought about the decision to engage in the design, development and production of pumps, both air and fluid types."

Engineers are working on plans for the company's new products, Jigs, fixtures and special machinery are among the regular products of the 15-yr-old concern.

First product of the new division will be an aircraft pump, but the company intends to go into all types of pumps, including fuel and automotive.

Construction work on a new building costing an estimated $150,000 will begin about Jan. 1, according to Mr. Hecker. As a result of the expansion, the company expects ultimately to employ about 550, compared with the prewar peak of 400.

Workers at Wright Get 30 Pct Wage Increase

Detroit

• • • An increase in basic wages approximating the 30 pct demand of the CIO United Auto Workers Union has been granted by Wright Aeronautical Corp., Paterson, N. J., it was announced recently.

Negotiations in the East resulted in a flat increase of 22¢ per hr to all hourly-rated employees plus an additional one cent based upon the payroll to be used in correcting wage rate inequities, plus an additional three cents to be used to place all employees on a general equality.

This increase of roughly an average 26¢ per employee compares with a previous hiring rate of 65¢ an hr and a previous highest plant rate of $1.41. The new hiring rate is 77½¢, with a 10¢ increase in 30 days and a minimum of $1.03 in another 30 days, with a top of $1.63.

The new contract also provides that in case of layoff at least three days' notice must be given or else vacation pay paid if the latter is the larger amount, with vacation pay to be figured to the closest month.

Ford Plans Mercury And Lincoln Assembly Line in Raritan, N. J.

Dearborn, Mich.

• • • Ford Motor Co. has purchased 78 acres of land in New Jersey, 30 miles southwest of Manhattan, as a site for construction of a new plant to assemble Mercury and Lincoln automobiles.

Located in Raritan township, the property is near Metuchen on U. S. Highway No. 1 between New Brunswick and Newark and is on a branch line of the Pennsylvania Railroad. Construction of a 500,000 sq ft building is expected to start early next spring.

To be known as the Raritan plant, the new plant will be capable of producing 350 cars a day, and will be the first plant to build Lincolns outside the Detroit area. The single story structure will be of brick and steel construction and will include an attached office building. During full production it is expected to employ a maximum of 2500 workers from nearby communities.

The company will continue to produce Ford cars and trucks at its plant in Edgewater, N. J.

Continental Starts Aero Engine Delivery

Muskegon, Mich.

• • • Continental Motors Corp. has started deliveries of three new 6-cylinder aircraft engine models for light planes, and by the end of the year will have four additional 6-cylinder models in production.

When all are being manufactured Continental will blanket the light plane field with engines ranging from 65 hp to 210 hp. This program is geared to customer orders calling for 1946 deliveries far in excess of any previous year.

All the 6-cylinder engines are air-cooled horizontally opposed jobs, rated at 100, 115, 125, 150, 165, 185 and 210 hp. They are similar to the 4-cylinder models rated at 65, 75 and 85 hp.

In addition, Continental will produce both 7-cylinder and 9-cylinder radial engines for larger planes, rated respectively at 220 hp to 240 hp and 525 hp.

REPAIR VAN: *Four of these repair vans have been sent to Europe to assist in motor repair work. Each mobile unit is equipped with grinding wheels, drilling machine, lathe and tools for demonstration, an oxyacetylene welding plant and in the trailer an arc welding set with self-generating plant.*

Sen. George to Urge Complete Repeal of the Excess Profits Tax

Washington

• • • Complete repeal of the excess profits tax, effective Jan. 1, 1946, as has been recommended by the Treasury Dept., will be urged by Senator George, D., Ga., Chairman of the Finance Committee to which has been sent the tax reduction bill passed by the House on Oct. 11 by a 343 to 10 vote. While other changes will also be proposed, it is expected that the general pattern of the individual rates adopted by the House will be followed by the Senate Committee, although it may also get back of the Administration to repeal outright the 3 pct individual normal tax, which the House declined to do.

Instead of the Administration's proposal for entire repeal of the excess profits tax at the end of the current year, the House reduced the present rate of 85.5 pct to 60 pct to extend throughout 1946 after which it would be repealed. Instead of repealing the 3 pct individual normal tax, the bill eliminated the $500 exemption and allowed in its place exemptions of $500 each for the taxpayer, his spouse and each of his dependents, effective Jan. 1, 1946.

The surtax rates were revised, effective next Jan. 1, so that generally the reduction of normal tax and surtax for any taxpayer will not be less than 10 pct.

The corporate surtax was reduced 4 percentage points as of Jan. 1, 1946. This results in a minimum corporate and surtax rate of 21 pct in place of the present 25 pct and a maximum combined rate of 36 pct in place of the present 40 pct.

The capital stock tax was repealed beginning with the capital stock tax payable on July 31, 1946. The declared value excess profits tax beginning with the related year also was repealed.

Excise war tax rates were reduced to the 1942 rates, effective July 1, 1946. These are the war tax rates imposed by the act of 1943 to be effective until six months after the termination of hostilities.

The bill, the first one in 16 years that provides for important tax reductions, would slash individual corporation and excise taxes by approximately $5,350,000,000 in 1946. It also would eliminate some 12,000,000 individuals from the income tax rolls.

Corporation taxes would be reduced by $1,888,000,000. Individual tax savings would be about $2,627,000,000. Elimination of excise taxes would mean savings to consumers of $535,000,000 in the last half of next year.

Canadian Pig Iron Output Drops to New Low for This Year

Toronto

• • • Canadian pig iron production dropped to the lowest level for the year in August, with output of 139,812 net tons, which was 60.5 pct of total capacity, and compares with 150,812 tons in July, or 65.1 pct and 151,452 tons in August 1944. In the month under review production included 110,519 tons of basic iron, of which 107,129 tons were for further use of producing companies and 3390 tons for sale; 22,567 tons of foundry iron, all for sale, and 6726 tons of malleable iron, all for sale.

For the first eight months of the year production of pig iron totalled 1,232,162 net tons, against 1,266,979 tons for the same period of 1944 and 1,184,064 tons in the 1943 period.

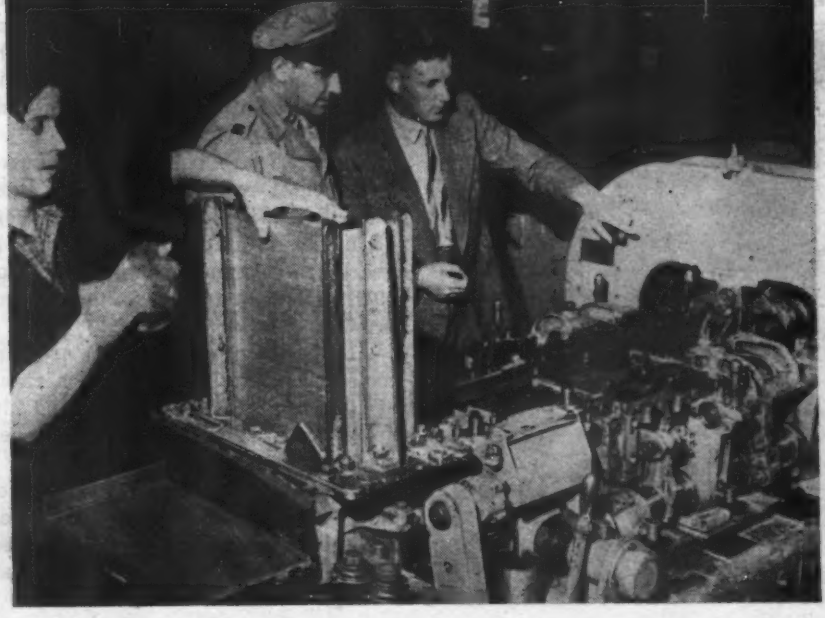
During August, eight furnaces were in blast, one banked and five blown out of the total of 14 blast furnaces in Canada.

Production of ferroalloys for August amounted to 15,668 net tons, compared with 15,750 tons in the previous month and 18,808 tons in August last year. The month's output included ferrosilicon, silicomanganese, ferromanganese, ferrochrome, chrom-x and ferrophosphorus. For the first eight months this year production of ferroalloys totalled 130,090 net tons compared with 124,558 tons for the 1944 period and 151,630 tons in 1943.

Following are comparative monthly figures for pig iron and ferroalloys:

	Pig Iron	Ferroalloys
January	155,969	12,130
February	149,487	13,402
March	165,817	16,434
April	156,070	18,250
May	155,574	19,883
June	159,046	18,473
July	150,387	15,750
August	139,812	15,853
Total	1,232,162	130,275

AUSTRALIAN CANS: *An executive points out the lend-lease sign on a 300-a-minute body-making machine to a U. S. Army food procurement officer at an Australian canmaking plant which turns out more than a million cans a day for canneries fulfilling U. S. and Allied canned food contracts.*



Tank Arsenal Shuts Down

Detroit

• • • Fisher Body Tank Arsenal is going out of production. Built in early 1942 at Grand Blanc, Mich., it pioneered the M-4 General Sherman, the M-10 tank destroyer and the M-26 General Pershing, and produced approximately 21,000 tanks of various types for battlefronts around the globe. Since VJ-Day, only Pershing tanks have been built.

Charges Freight Rate Rises Cause Unsound Industrial Dispersal

Chicago

• • • The relation of freight rates and decentralization of industry is a postwar problem of direct concern to shippers of the United States, E. G. Plowman, vice president-traffic, United States Steel Corp. of Delaware, told Chicago transportation leaders here recently.

His warning against rising freight rates was addressed to members of the Traffic Club of Chicago and the Midwest Shippers Advisory Board meeting in the Palmer House.

"Traffic men know," he said, "that one factor which determines the economic size of any particular industrial unit is the cost of and transportation of inbound raw materials and outbound finished products.

"Traffic men know that these costs have been rising. As they rise, decentralization becomes more necessary, and mass production becomes less possible. The benefits of industrial efficiency should not be dissipated when such efficiency is a characteristic of concentration. It is justifiable on economic grounds only when decentralization improves and does not impair industrial efficiency.

"Decentralization of industry, when economically unsound, should not be forced or impelled by rate adjustments."

An important contributing factor impelling decentralization of industries, according to Mr. Plowman, is the use of the percentage methods in making freight rate increases. He stated that the percentage methods have this effect "because it does more than increase the general rate level; it also increases the relative spread or difference in freight charges between competing sources of raw material and between competitive markets."

Mr. Plowman also warned against "indiscriminate expansion" of transportation facilities by the government, and suggested that public agencies should be required to obtain certificates of convenience and necessity "before spending millions upon new highways, waterways, or airways."

"This suggestion," he added, "may become more important as such undertakings become more and more duplicated and competitive with existing transportation facilities."

He urged traffic leaders to study the merits of this proposal, pointing out that they "may well view with concern proposals to expand the transportation facilities of the United States.

"There is ground for fear that part of this postwar expansion may have to be paid for, not from operating economies," he said, "but by increased rates and charges."

Mr. Plowman lauded wartime management of American transportation for its effectiveness, pointed out that there are many traffic problems of wartime still to be worked out, principally the transportation necessary for demobilization of troops, and stated that with the war over it is essential now that the railroads re-equip themselves with new passenger cars of better design and improved utilities, and that thousands of old, worn-out and obsolete freight cars be replaced.

Steel Meeting Adjourned

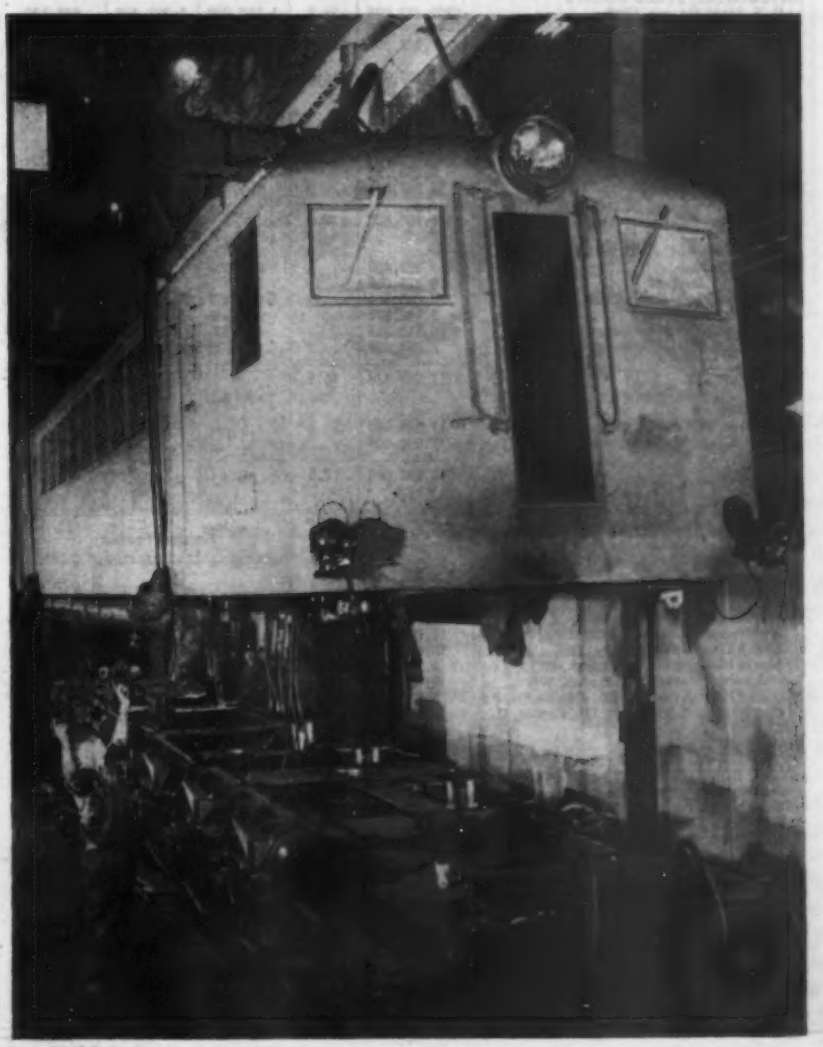
Pittsburgh

• • • The meeting of John A. Stephens, vice-president, U. S. Steel Corp. of Delaware, and representatives from five steelmaking subsidiaries of U. S. Steel with Philip Murray, president, United Steel Workers of America (CIO), and his negotiators was adjourned until Tuesday, Oct. 23. The union presented its demands for $2 a day wage increase. Mr. Stephens stated that in any matter as important to the country as this one, careful study must be made of the proposal and its effect on steel prices.

The answer to the union demand will be made at that time.

The five companies involved are American Steel & Wire Co., Carnegie-Illinois Steel Corp., Columbia Steel Co., National Tube Co., and Tennessee Coal, Iron & Railroad Co.

POWER FOR BRAZIL: *The East Pittsburgh plant of Westinghouse Electric & Mfg. Co. has assembled this big locomotive with* 140 *tons of electric pulling power. Six electric motors supply a total of almost* 2000 *hp and is capable of pulling* 12 *fully loaded cars at a maximum speed of* 56 *miles an hr.*



SPA Leaves Door Open for Geneva Steel Plant Disposal

Washington

. . . By DAVE ANSBORO . . .

o o o

• • • **Reporting to Congress on policies governing disposal of surplus iron and steel plants which cost the government more than $5 million each, Surplus Property Administrator W. Stuart Symington ruled out government subsidies which would eliminate other equally or more efficient facilities. He strongly intimated that a considerable write-off is inevitable and left the door open for every reasonable offer on the $200,000,000 Geneva plant.**

Of the 29 government-owned plants involved which have an aggregate value of $700 million, 25 are DPC plants and four are owned by the Services. All but the Geneva and Andrews, Newport, Ky., electric furnace plants are encumbered by purchase options. The report was submitted on Oct. 11.

The report said that prospective earnings will be the primary yardstick in fixing prices of the plants. At the same time it was pointed out that the unusual risk involved in new steel producing areas and factors affecting the "general economy" will also be vital considerations. Adherence to a pricing policy based on reproduction costs, the report states, would seriously impede disposal of surplus facilities. Real value to a prospective buyer will depend primarily upon ability to produce income over and above amortization, interest and depreciation, as well as operating costs. For the government to attempt to get more than a price measured by earning power, regardless of what the facilities cost, will hamper sales and lessen financial return to the government. The report proposes that the cost of equivalent facilities set an approximate price maximum. The price must, the report adds, reflect additional expenditures for expansion and improvements necessary for peacetime production.

Considerations in addition to the bid price outlined in the report include: (1) Diversification and scope of the proposed production program consistent with economic operation; (2) proposed steel pricing policy, the prospects of lower prices to users being considered the primary test of effective, independent competition; and (3) the competitive position of the bidder in the market to be served by the plant.

When reasonable sales prices cannot be agreed on or the objectives of the Surplus Property Act can be better complied with, the report states, surplus plants may be leased for periods exceeding five years or for lesser periods if they contain options to purchase. Rental provisions in such leases will take into consideration: (1) Incentive for maximum efficient operation; (2) incentive for low operating costs and lower steel prices; (3) rental adjustments to compensate for operating results achieved; (4) application of a reasonable proportion of rental payments to the purchase price upon exercise of option to purchase; (5) basis for determining sales price based on actual operating experience where not agreed to at the outset; (6) an escape clause terminating the lease or option in the event of improper or inefficient management or anti-trust violation.

In those cases where existing facil-

Government-Owned Iron and Steel Plants Costing Over $5 Million and Technically Capable of Independent Operation

Operator and Location	Cost	Percent of Total	Capacities (Net Tons)		
			Pig Iron	Ingots	Coke
INTEGRATED STEEL PLANTS					
U. S. Steel, Geneva, Utah	$202,493,208	26.3	1,150,000	1,283,400	971,100
Republic, Chicago	92,402,300	12.0	450,000	790,000	408,000
Am. Rolling Mills, Houston, Texas	37,267,005[1]	4.8	274,000	203,213	232,000
U. S. Steel (Homestead-Duquesne-Braddock, Pa.)	123,587,987	16.0	880,000	1,565,000	.....
Total	$455,750,500	59.1			
SEMI-INTEGRATED PLANTS (Electric Furnace)					
Republic, Canton, Ohio	9,853,759	....	.....	318,000	.....
Andrews Steel Co., Newport, Ky.	5,247,047	....	.....	190,000	.....
Total	$15,100,806	2.0			
BLAST FURNACE AND COKE PLANTS					
Inland, Chicago	35,123,400	....	854,000	.....	733,000
Republic, Cleveland	28,873,000	....	460,000	.....	395,000
Lone Star Steel, Daingerfield, Texas	28,005,384[1]	....	438,000	.....	400,000
Republic, Youngstown	9,146,572	....	392,000	.....	.....
Koppers Co., Granite City, Ill.	8,315,330	....	465,000	.....	290,000
Pittsburgh Steel, Monessen, Pa.	7,784,000	....	432,000	.....	.....
Total	$117,247,686	15.2			
IRON ORE					
Republic, Port Henry, N. Y.	11,980,000	....	.....	.....	.....
Jones & Laughlin, Benson Mines, N. Y.	7,000,000	....	.....	.....	.....
Total	$18,980,000	2.5			
			Finished Products		
STEEL FORGING PLANTS					
Erie Forge & Steel Co., Erie, Pa.	13,000,000	....	15,000	.....	.....
Wyman-Gordon, Harvey, Ill.	12,291,165	....	98,280	.....	.....
Heppenstall-Eddystone, Eddystone, Pa.	12,000,000	....	24,000	.....	.....
Ladish Drop Forge, Cudahy, Wis.	10,748,467	....	80,700	.....	.....
Mesta Machine Co., Pittsburgh, Pa.	9,798,431	....	60,000	.....	.....
Ridgewood Steel Co., Cincinnati, Wis.	9,408,619	....	21,600	.....	.....
United Engr. & Foundry Co., New Castle, Pa.	8,327,344	....	42,000	.....	.....
Canton Drop Forging Mfg. Co., Canton, O.	5,133,802	....	2,250	.....	.....
Total	$80,705,828	10.5			
STEEL CASTING PLANTS					
American Steel Foundries, Indiana Harbor	25,044,951	....	106,000	.....	.....
Scullin Steel Co., St. Louis, Mo.	16,307,871	....	93,000	.....	.....
Ohio Steel Foundry Co., Lima, Ohio	9,396,530	....	16,800	.....	.....
U. S. Steel, Pittsburgh, Calif.	8,500,000	....	30,000	.....	.....
Symington-Gould, Rochester, N. Y.	8,440,061	....	41,400	.....	.....
Birdsboro Steel Foundry Mfg. Co., Birdsboro, Pa.	7,400,000	....	56,400	.....	.....
Pittsburgh Steel Foundry, Glassport, Pa.	6,644,163	....	18,000	.....	.....
Total	$82,733,576	10.7			
Grand Total	$770,518,386				

(1) Includes one-half cost of coal mines at McAlester and McCurtain, Oklahoma.

ities are unsuitable for peacetime production, the disposal agency may undertake installation of such other surplus government facilities as would increase the salability of the plant. Furthermore, the report points out, if continued limited operation will involve savings in cost which would otherwise be incurred by complete shutdown of facilities for which disposal possibilities are favorable, the SPA will arrange for limited operation until disposal of the plant.

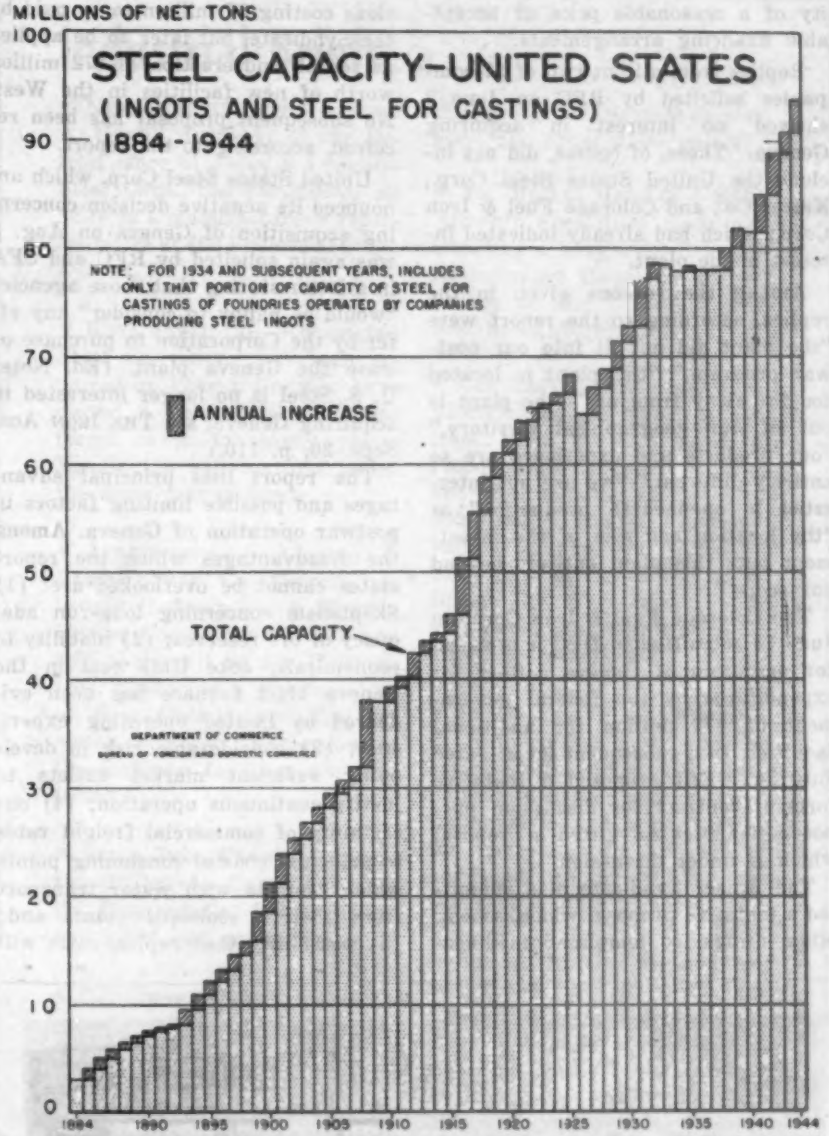
Of the 29 plants involved which are technically capable of independent operation, six produce finished rolled steel products, six are blast furnaces (four of which have coke-making facilities including beneficiating plants), two are iron ore mining developments, and 17 are steel forging or casting plants.

Many of the forging and casting plants could be operated equally well by any qualified operator, it is stated, and the ore properties should also be capable of such operation. Two of the integrated plants, the two semi-integrated plants and most of the blast furnace and coke oven plants, the report adds, might well prove difficult to operate by other than the present operators.

With regard to the blast furnace plants, the report finds that only steel producers located a very short distance away are likely to be prospective purchasers. Furthermore, these furnaces do not present attractive possibilities for commercial operation. In any event, the report declares, blast furnace disposability will be determined by the postwar level of steel business regardless of whether or not they are acquired by other than the present operators.

In the case of the integrated facilities at Houston, Tex., which are operated by the American Rolling Mill Co., the report states that independent operation would entail either the building of steel producing and new rolling facilities or substantial dependence upon outside sources for pig iron. Even though the government-owned Houston plant is technically capable of independent operation as a pig iron producer, insofar as steel production is concerned, it is pointed out, it will be most logically operated in conjunction with the privately owned facilities.

With regard to the government-owned integrated operation in the Pittsburgh district (Homestead-Duquesne-Braddock), the report says that the necessary balance for independent



operation is not provided and the disposal problem is further complicated by transportation and other services provided by the present operator, the Carnegie-Illinois Steel Corp.

Limitations on the semi-integrated electric furnace plants at Canton, Ohio, and Newport, Ky., are declared to relate to the scope of their operations. Republic Steel Corp., the present operator, the report says, has completely integrated alloy steel making facilities in the Canton area although they are separate from the government-owned facilities which do not include any steel finishing facilities. Much the same situation exists in the case of the Andrews plant in Newport.

Whether these plants or others where the degree of dependence on pre-existing facilities is less apparent, are capable of economic operation as independent plants will be specifically determined by extensive individual analyses, it is said.

Concerning the interests of small business, it is pointed out that SPA's control is limited to plants costing more than $5 million. Thus, since economies in steel making are associated with large-scale integrated production, the report states that disposals within the Small Business Act purview would neither promote competition within the iron and steel industry nor promote the real interests of small business. However, SPA recognizes that small business could operate some of the castings and forging plants.

Commenting on the disposal prospects of the Geneva plant, the report states that, "From the limited interest which has been developed in securing prospective purchasers or lessees for the plant, there appear to be either limited possibilities for postwar competitive operation or that there is apprehension concerning the possibil-

ity of a reasonable price or acceptable financing arrangements."

Replies from all but two of 27 companies solicited by RFC on June 7 showed no interest in acquiring Geneva. These, of course, did not include the United States Steel Corp., Kaiser Co., and Colorado Fuel & Iron Corp., which had already indicated interest in the plant.

Among the reasons given in the replies, according to the report were "the plant did not fit into our postwar program," "the plant is located too far away from us," "the plant is out of our geographical territory," "our products and experience are so entirely different," "we are not interested in openhearth production" or "the location and size of the investment puts this plant entirely beyond our scope."

The Colorado Fuel & Iron Corp. on June 14 submitted to DPC a proposal for operation of Geneva calling for expenditures by the federal government of $73 million for additional facilities. In a subsequent letter dated July 24, CF&I proposed a tentative form of contract for discussion purposes and later submitted a proposal which is under discussion.

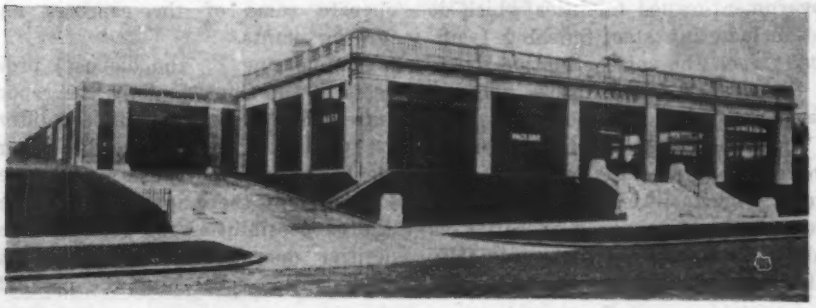
The Kaiser Syndicate also submitted a tentative proposal which, among other things, contemplated modifications costing $7 million to be paid by the Syndicate, but later to be applied as rental, and erection of $72 million worth of new facilities in the West. No subsequent proposal has been received, according to the report.

United States Steel Corp. which announced its negative decision concerning acquisition of Geneva on Aug. 8 was again solicited by RFC and SFA in a letter stating that those agencies "would be happy to consider" any offer by the Corporation to purchase or lease the Geneva plant. (Ed. Note: U. S. Steel is no longer interested in acquiring Geneva, see THE IRON AGE, Sept. 20, p. 110.)

The report lists principal advantages and possible limiting factors in postwar operation of Geneva. Among the disadvantages which the report states cannot be overlooked are: (1) Skepticism concerning long-run adequacy of ore reserves; (2) inability to economically coke Utah coal in the Geneva blast furnace has been evidenced by limited operating experience; (3) considerable risk in developing sufficient market outlets to justify continuous operation; (4) uncertainty of commercial freight rates to principal coastal consuming points which compete with water transport from eastern seaboard points and; (5) possibility that capital costs will be out of line with competitors because cost of reproduction of equivalent facilities and the large investment in new facilities.

Emphasizing that the principal deterrent to disposal over which the SPA has substantial control involves the terms of sale or lease, the report states that in accordance with the objectives of the Act, unreasonable capital costs will not be permitted to be a barrier to the disposal of Geneva.

BEFORE AND AFTER: *Packard's British distribution center was turned into rubble by one of the last V-2 bombs which came over the island. Reconstruction work is now going forward to restore the establishment to its prewar appearance.*



New Australian Steel Industry Innovations Reported at Meeting

Detroit

• • • Because the steel industry of Australia is comparatively isolated from the rest of the world, its engineers have developed a number of interesting innovations which might well merit study by Americans, the Detroit Section of the Association of Iron & Steel Engineers was told at its initial fall meeting in October by Lewis B. Lindemuth, New York consulting engineer.

Australia, he said, is favored by several factors which make it possible to produce at comparatively low prices. Ore of 62 pct quality is available on tidewater, limestone is nearby, and the commonwealth's two steel mills are virtually built over coal workings. With ore costing less than $2 per ton, and the labor rates around 75 pct of those prevailing in this country, pig is produced at around $4.90 per gross ton and ingots at less than $10 per gross ton, Mr. Lindemuth said. However, because the needs of Australia's 7,200,000 citizens are just as diversified as those of other large countries, and because the quantities required are consequently limited, the prices of finished steel products are higher than our own.

Australian ore, coming from Port Fairy, is 62 pct quality lump hematite, containing 4 to 5 Pct Si, about 2 pct Mn, and 0.04 pct P, which produces from 0.08 to 0.10 P in the pig. Because the ore is so rich it is necessary to make additions in the melt to provide enough slag. The typical charge, due to the scarcity of scrap in Australia, is about 80 pct hot metal and 20 pct scrap, and accordingly some 18 pct of the metal must be lump. Open hearths are heated by tar, producer gas, openhearth gas, and other fuels, no oil being used. Employing such fuels, approximately 346 heats are averaged per roof. A

250-ton furnace produces approximately 19 tons of steel hourly.

Australia's two steel mills are located at Newcastle, about 100 miles north of Sydney, and at Port Kembla, about 50 miles south of Sydney, both owned by Broken Hill Proprietary Co., Ltd., Melbourne. These two mills together produce around 2,250,000 tons of steel annually. At Newcastle equipment includes one 500-ton and two 700-ton blast furnaces. At Port Kembla, ore is smelted in two blast furnaces, one of which is a new 1400-ton unit with 24-ft hearth. Port Kembla has seven openhearths, three of 175-ton rating and four of 250-ton rating. Mills at both points are electrically driven, except for one single application.

Mr. Lindemuth did not believe that Australia would seek to enter the export steel trade, pointing out that its production is pretty well in balance, and that if efforts were made to export finished steel it would be necessary to provide not only new rolling facilities, but also new blast furnaces, openhearths, etc., at an estimated cost of at least $200 million.

Welch Company Plans Large Hot Strip Mill

London

• • • Plans for a large, continuous hot strip mill at Margam, near Port Talbot, Wales, are well advanced, E. H. Lever, chairman of Richard Thomas & Baldwins, Ltd., said in a statement to shareholders. The new mill will be capable of producing approximately 18,000 tons of hot strip and other products a week, of which a large proportion will be available to the tinplate industry.

Plans, too, are well advanced for the formation of a new company to erect and run two new modern cold reduction plants, mainly for tinplates in the Llanelly and Swansea areas, the ordinary capital of which will be subscribed by the company and certain other companies in the tinplate trade, notably the Briton Ferron Steel Co. and Llanelly Associated Tinplate Cos.

A smaller cold reduction plant may possibly be erected in the Monmouthshire area, but no responsibility for this will rest upon Richard Thomas & Baldwins. When these new plants are in full operation, it will probably be necessary to close down completely the majority of the old type mills and either sell them for scrap or convert them, where practicable for other uses.

Industrial Briefs . . .

• NEW DETROIT OFFICE—James A. Upstill, formerly of the Detroit office of Jones & Laughlin Steel Corp., has established an office as a manufacturer's representative at 403 Boulevard Bldg., Detroit 2.

• BUYS STEEL CO.—Kensington Steel Co. control has been acquired by Poor & Co. who have owned a substantial stock interest in it for many years. Kensington will continue under the same management.

• ACQUISITION — Clayton & Lambert Mfg. Co., Detroit, has bought Hoffman Gas & Electric Heater Co., Louisville, Ky., and will operate it as the Hoffman Div., producing a complete line of gas, electric and fuel oil water heaters. Expansion of the Hoffman facilities are projected.

• SELLS TOOL PLANT—International Detrola Corp. has sold its Indianapolis, Ind. machine tool plant and equipment.

• GE ORDERS DROP—Orders received by General Electric Co. during the first nine months of this year amounted to $660,846,000, compared with $1,094,199,000 in the same period last year, a decrease of 40 pct.

• BUYS COMPANY—The Arms-Franklin Corp., Youngstown, Ohio, has purchased control of the Taylor-Wilson Mfg. at McKees Rocks, Pa. The new officers are: M. I. Arms, chairman and executive vice-president; H. M. Wilson, president; J. A. McColm, Jr., treasurer and assistant secretary; O. A. Christiansen, secretary and assistant treasurer.

• ELECTRONIC PLANT — As a part of the Bell System's $2 billion postwar construction program, Western Electric Co. has purchased property and will construct a new electronic components plant at Allentown, Pa. The new plant when operating at capacity will provide employment for about 1500 people.

• TO BUILD HANGAR — Engel Aircraft Specialties plans constructing a hangar 80 ft by 140 ft, including shops and display rooms, on the Escondido Airport in California.

• CONTRACT AWARD — General Electric Co. has signed a contract with E. J. Cramer of Pittsfield for a concrete, brick and steel building to cost $75,000, and to house equipment valued at $153,000. Also the company has signed the J. W. Bishop Co., Worcester, to build a chemical department office addition, to cost $85,000.

• BUYS TOOL FIRM—Raymond G. Hathorn has purchased the entire capital stock of the Williams Tool & Engineering Corp., Indianapolis, and is negotiating for approximately $100,000 of additional equipment for the firm's expanding business.

• BENDIX BUILDS—Ground has been broken in Troy, N. Y., for a new factory to be built by the Marshall-Eclipse Div. of Bendix Aviation Corp. The new plant which will cost more than $500,000 will employ considerably above the wartime peak.

• RESEARCH WORK — Libbey-Owens-Ford Glass Co., Toledo, plans to enlarge its research activities by the construction of a new laboratory, which will include an enlargement of the engineering department, a new building wing for laboratories and shops for testing, experimenting and pilot plant, miniature glass furnaces, test towers and other equipment.

• NEW PLASTIC FIRM—A new company to manufacture precision gears from permanent molds is being organized by Milwaukee interests who will have temporary offices at 606 W. Wisconsin Ave., and who will call the firm the Roto-Dynamic Gear Mfg. Co.

MACHINE TOOLS

. . . News and Market Activities

Surplus Tool Disposal Still Hectic

Cleveland

• • • Reports of enlisting the aid of dealers in the disposal of government-owned surplus machine tools have been heard intermittently for two years with little or nothing ever developing. Actually, distributors of new machines and manufacturers have been variously considered along with the dealers as possible aids in the tremendous undertaking.

Whether or not these reports were valid is a somewhat academic question, since the nut to crack is where to draw the line in selecting distributors. It might be ruled that all who were distributors in 1939 or 1940 are now distributors, dealers, or whatever they were then, but the Smaller War Plants Corp. and the Veterans' Administration would offer definite opposition. Men are coming back in numbers now and are anxious to engage in business. Thus the problem lies in deciding who shall be considered a legitimate dealer.

It has been suggested that about the only thing SPB, RFC or anybody else can do is to make every potential distributor of surplus machine tools certify that he is buying for resale. This represents the optimum effort unless a premium is to be put on quantity production. What will eventually be done about this, of course, is anybody's guess. But something should be done about it soon, for many reputable dealers are finding the pickings slim.

Sales to lessees, some at 25c on the dollar, are going up and trade sources are frank to admit that the industry is in for a period of seeing old companies buying government machines at a rate no one ever anticipated. Buying is not restricted to the war babies and the only difficulty seems to be that RFC does not have enough personnel to process the orders. This situation resolves itself into a simple fact; if the lessee takes the equipment he has on hand, he is eliminated as a customer and if he isn't buying the government tools in his plant, he wouldn't be a customer anyway.

However, with sales of surplus equipment and to lessees in possession mounting by the hour, it is not impossible that sentiment or business judgment favoring the inclusion of regular channels of trade in the disposal problem may be on the wane. As a result of the boom buying now going on, the agencies involved may easily decide that they are more than equal to the problem.

Disposal sales of surplus property of the Cleveland Div. of RFC are not just pin money. Top item in sales for the last half of September was $240,000 for forging machine equipment to Wyman Gordon Co., Harvey, Ill. Second was $155,944 for 7.5 million lb of wire rod to L. A. Young Spring & Wire Co., Trenton, N. J. A Waterbury concern took on nut formers and wire reels for $50,910. Blaw-Knox secured $20,787 worth of machines. Several screw machines sold at more than $8000 each. A milling machine assembly brought in $32,500. The totals are beginning to look like a very good collection.

• • •

NTDMA Members Elect Officers at Meeting

Buffalo

• • • The National Tool & Die Manufacturers Assn. re-elected to the presidency Richard F. Moore, of the Moore Special Tool Co., Inc., Bridgeport, Conn., at a two-day meeting in Buffalo, recently.

Other officers elected for the coming year are Willis G. Ehrhardt, Ehrhardt Tool & Machine Co., St. Louis, first vice-president; Leonard E. Mingus, William P. Stein & Co., Inc., Rochester, N. Y., second vice-president; Jack Kleinoder, John Volkert Tool & Die Co., New York, secretary, and H. F. Jahn, B. Jahn Mfg. Co., New Britain, Conn., treasurer.

George S. Eaton of Cleveland was reappointed executive secretary. National headquarters of the association are in the Union Commerce Bldg., Cleveland.

Mr. Moore predicted an increasing use of more elaborate special tooling throughout industry, as reconversion progresses—especially on new models. He stated that better tooling is the only practical means of holding down manufacturing costs in a time of rising wage rates like the present. By this thorough preparation for efficient production the output from a plant's metal or plastic working equipment can be greatly increased and costs lowered.

Frank Griffin, Apprentice-Training Service, U. S. Dept. of Labor, told NTDMA directors of the imperative need to reestablish training programs at once. Long apprenticeship is necessary to turn out these most highly skilled craftsmen and that has been impossible since the Armed Services started taking all young men at 18. Mr. Griffin emphasized that without the work done by these craftsmen, neither war plants nor peacetime industry could operate, as they make the specially designed tooling without which mass-production lines cannot turn a wheel.

•

Machine Tool Bookings Good

Cincinnati

• • • Optimism continues to be strong in this market as tool builders report bookings to be good. Business sources appear to be widely distributed with foreign business as prominent as domestic. Export orders are in some cases complicated by agents' requests for settlement of the problems arising from orders never completed because of the German invasion early in the war. While most companies are willing to settle these problems in fair manner, generally by filling the order now, the change in models over the past three or four years poses further difficulties. The rapid development of tools under war pressure has so changed models that old patterns, jigs and dies have been destroyed, and perhaps prices increased. Thus a builder cannot supply the originally ordered machine while the foreign agent is not happy over taking a different model at a higher price.

He wants a JOB

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The world's finest BORING and milling machine.

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with a

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USERS report two to three times the output with greatly improved accuracy as compared to other methods.

AUTOMATIC PRECISION . . . Automatic positioning between holes is controlled within less than one ten-thousandth part of an inch . . . feather touch pressure controlled slide locks positively control locking uniformity after positioning . . . all functions are responsive to the centralized finger tip control.

DeVLIEG MACHINE COMPANY DEVLIEG JIGMIL **450 FAIR AVE. FERNDALE 20, (Detroit) MICH.**

NONFERROUS METALS

. . . News and Market Activities

Lead Continues In Short Supply Here

New York

• • • Producers indicate that even with relaxed lead restrictions under the control order M-38, lead is still in urgent demand and being bought actively. In order to meet requirements, imports of 15,000 to 20,000 tons per month are coming in and there is some evidence that certain foreign suppliers may soon look elsewhere to return to their former markets in the war devastated areas of Europe. Under the circumstances there is little or no promise of further relaxation of restrictions for some time to come.

•

Aluminum Foundry Burns

Cleveland

• • • Fire and a series of explosions wrecked the E. F. H. Aluminum Foundry & Smelting Co. plant recently, causing damages estimated at $200,000.

Operated and owned by Edward, Frank and Herbert Schmeller, former officers of the National Bronze & Aluminum Foundry Co., the company was the third largest aluminum foundry in the country at the time. National Bronze & Aluminum Foundry Co. was destroyed by a $2,500,000 fire Sept. 30, 1941.

The fire which started in the City Enameling Co. plant just west of the EFH Foundry, broke out among piles of aluminum scraps and shavings, and flames shot 150 ft in the air as dense clouds of smoke billowed over nearby buildings.

•

Zinc Shipments Decline

New York

• • • September shipments of slab zinc as reported by the American Zinc Institute have dropped to 41,357 short tons which represents the latest step in a long series of monthly declines from the peak business in March, 94,494 tons. The prevalence of strikes in consuming plants and the present reconversion period are reported to be responsible for this significant drop in consumption. While production too has dropped some to a tonnage of 61,600, this has declined much more slowly and additions have been made to the stockpile during the last few months. Stocks of slab zinc at the beginning of September totaled 213,556 tons, and at the end of September were 233,328.

The operation of the Premium Payment Plan and importation of foreign zinc continue in effect.

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Antimony Import Prospect Not Good

New York

• • • Antimony, one of the few metals which are subject to restriction by government control, is still in a tight supply position and the industry expects that shipments from China may not be received for six months, at least. This is very largely due to the shortage of shipping facilities, although there have been no official announcements as to production in China and whether antimony can be exported profitably in view of the present inflationary trends current in that country.

•

Cadmium Supply Tight

New York

• • • Suppliers report that cadmium is in short supply although it is not long since this metal was reported to be fairly well in balance. Cadmium is no longer subject to governmental control.

•

Nickel Imports Reported

New York

• • • Nickel imports in 1944 totaled 137,932 tons, it was revealed by a preprint chapter of the 1944 Minerals yearbook published by the Bureau of Mines.

While Canada continued as the chief source of supply during 1944, the United States also imported 18,121,982 lb of matte (averaging 77 to 78 pct nickel) from New Caledonia, 670,187 lb of electrolytic nickel from French Morocco and 7,680,367 lb of oxide from Cuba. Domestic supplies were further augmented by shipments received from the United Kingdom.

Copper Orders Decline; Exceed Domestic Output

New York

• • • In its statistical report for September the Copper Institute reported a significant drop in refined copper production, the effects of strikes among refinery personnel. September production dropped to 45,145 short tons, which was approximately 24,000 tons lower than August. Crude copper production is being maintained satisfactorily, having dropped only 8500 tons in the space of two months to a September production of 64,369.

Meanwhile deliveries to customers have held up fairly well, having dropped to a tonnage of 83,362 in September in small monthly losses since June. However, April and May were roughly 161,000 and 139,000 tons.

Producers report that they are receiving orders for November delivery but the market is fairly quiet due to the impact of the strike news on the consumption of raw materials. October sales should be somewhat lower than September's although deliveries will require all domestic production and some copper from the stockpile.

The purchase of copper through the Premium Price Plan is expected by producers to continue at least until the expiration of the period covered by the legislation, which is the middle of 1946, since there has not yet been any move to end the subsidy. However, the purchase of copper from foreign producers is now up for consideration since outstanding contracts expire at the end of October. The president of Chile is reported to be in New York at the present time, and it can be anticipated that discussion of copper contract renewals will be on his agenda.

•

High Purity Manganese

Minneapolis

• • • A high purity ferromanganese containing approximately 0.06 pct carbon and the same amount of phosphorus and over 90 pct manganese will soon be marketed by the Electro Manganese Corp. here. This new grade of electrolytic manganese is to be marketed at a price of 23c per lb of contained manganese.

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, del'd (Min. 10,000 lb)	15.00
Aluminum pig	14.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars, per lb. contained Be	$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. valley	13.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$ 2.25
Iridium, dollars per troy oz.	$90-$100
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$100 to $104
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, New York, cents per oz.	71.11
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb unless otherwise noted)

Aluminum, No. 12 Fdy. (No. 2)	9.00 to 10.00
Aluminum, deoxidizing No. 2, 3, 4	$6.00 to 9.50
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	20.37	....	20.37
Copper, H.R.	....	17.37	....
Copper drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.13	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	26.50	26.25
Munts metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.13	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c.

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 23½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 28c. Hexagonals; ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths, 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 99 lb., 56c.; less than 25 lb., 66c.

NONFERROUS SCRAP METAL QUOTATIONS

†(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.00
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.00
Automobile radiators	7.25
Zincy bronze borings	7.00
Zincy bronze solids	8.00

OPA Group 3†

Fired rifle shells	8.00
Brass pipe	7.25
Old rolled brass	6.75
Admiralty condenser tubes	7.25
Munts metal condenser tubes	6.75
Plated brass sheet, pipe reflectors	6.25
Manganese bronze solids	7.00[1]
Manganese bronze solids	6.00[2]
Manganese bronze borings	6.25[1]

OPA Group 4†

Refinery brass	4.50*

*Price varies with analysis, [1]Lead content 0.00 to 0.40 per cent. [2]Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum*

Plant scrap, segregated

2S solids	8.00
Dural alloys, solids 14, 17, 18, 24S	
25S	4.00
turnings, dry basis	3.00
Low copper alloys 51, 52, 61, 63S solids	7.25
turnings, dry basis	5.75

Plant scrap, mixed

Solids	4.00
Turnings, dry basis	2.75

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	6.00
Old castings and forgings	5.00
Pistons, free of struts	5.00
Pistons, with struts	3.00
Old alloy sheet	5.00

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	3.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 36c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point in 500 lb. lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	25½
Electrodeposited	18½
Rolled, oval, straight	19½
Curved	20½
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	23½
Zinc, cast, 99.99, 15 in. or longer	16¼
Nickel, 99 per cent plus, frt. allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 100 oz. lots, per oz.	80

Chemicals

(Cents per lb., f.o.b. shipping point)

Copper cyanide, 1-5 bbls.	34.00
Copper sulphate, 99.5, crystals, bbls.	7.75
Nickel salts, single, 425 lb. bbls., frt. allowed	13.50
Silver Cyanide, 100 oz. lots, per oz.	0.6033
Sodium cyanide, 96 per cent, domestic, 100 lb. drums	15.00
Zinc cyanide, 100 lb. drums	33.00
Zinc sulphate, 89 per cent, crystals, bbls., frt. allowed	6.85

SCRAP

. . . News and Market Activities

Market Firm; Coal Strikes Lessen Interest

New York

• • • This week continued the unchanging price structure in the scrap trade although there was a minor change in the price of a few railroad specialties in St. Louis. Movement of scrap is slow throughout the country but prices are maintained firm by the relatively small scrap production after cancellation of military contracts. This factor is apparently sufficiently strong to dominate the market despite the effects of the low ingot rate at the present time and the threat of further declines in the ingot rate based upon current coal strikes.

This firm market condition applies to openhearth scrap, blast furnace, cast scrap and specialties of all kinds. One of the first signposts of a modification in this market will be scattered declines in blast furnace grades. However, there are those who consider that ceiling prices during the war were established at such a low point that there may be no broad disaffections from ceiling levels for some time to come.

The fact that the labor position of the scrap industry on the whole is in very poor shape would indicate that the availability of appreciable quantities of openhearth scrap will not improve the scrap supply picture.

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PITTSBURGH — The market here is dull, with mills taking all that dealers could sell up to the beginning of the week. However, with the slump in operations this week, there may be a drop in shipments to the mills. Brokers and dealers are playing pretty much of a guessing game right now because of the coal strikes, the potential steel strike, and present conditions. Prices are remaining firm, and while dealers can dispose of all the scrap they can obtain, there is very little new buying.

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CHICAGO — Supply of openhearth scrap in relation to demand is tighter than at any time since 1942. In addition to drying up of war sources of scrap, dealers are confronted with inability to move scrap from strike-bound plants. Such normally unacceptable items as low phos flashings are finding a demand with $1.50 springboard. Although operating rates were scheduled to drop this week based upon continuation of the coal strike, no sign of a lessening demand for openhearth scrap is evident, indicating that the market is strong enough to withstand a moderate period of decreased operations. Blast furnace grades, boosted to ceiling last week by the coal strike situation, appear susceptible to softening, however, and some expired orders at ceiling for short shoveling turnings have been cancelled. Country scrap is almost non-existent as a factor in the market.

•

PHILADELPHIA — The coal shortage has brought cast grades into an even more critical situation. Demand for turnings is still great while supply is limited. Although there are still some mills holding up shipments, prices for prepared scrap continue at ceiling. Large tonnages of unprepared scrap are being offered, mainly by the government, and these are being sold in most cases at below ceiling prices.

•

DETROIT — Demand continued strong this week and held all grades at ceiling. Cast continues scarce. Fixtures and equipment from war plants which are being reconverted continue to flow into scrap traffic here, and are being readily absorbed. Many dies are coming out, mostly steel.

•

BOSTON—Turning contracts for eastern Pennsylvania consumption expired Oct. 12, but prices are holding due to limited production. Most yards cannot figure costs due to labor situation, consequently don't want big tonnages of unprepared scrap. Continued demand for cast and low phos plate is the bright spot in an otherwise quiet market. Ft. Devens offers 7600 tons of mat runway scrap on an f.o.b. Boston basis, the largest open tonnage reported in a long time.

•

NEW YORK — Some factors in the market in this district have expressed mild surprise that there has been no drop of any scrap grade away from ceiling prices, particularly in view of the coal strikes, and the significant drop in the ingot rate over the past few months. The opinion has been hazarded that only a severely low scrap production could permit prices to be continued at ceilings. Scrap movement is very slow, with all grades, particularly blast furnace, in great demand. All buying factors are reported to be in the market.

•

BUFFALO—The coal strike has become the big *if* of the local scrap market. If the big mills are able to maintain openhearth operations anywhere near the current level, consumption of scrap will be increased sharply to compensate for reduced pig iron output. On the other hand, if steel production is suspended, shipments will be halted, with material backing up all along the line. Meanwhile, prices are strong at ceilings and supplies tighter than ever. Pittsburgh interests are reported paying ceilings and springboards in the central and eastern parts of the state for industrial scrap that ordinarily would be coming here. Another surge of water receipts is scheduled this week, with 5000 tons coming by lake and 7000 tons by the Barge Canal. The barges had been held up for several days by high waters in the Mohawk River district.

•

CLEVELAND—With the coal shortage becoming steadily more acute, scrap market conditions here are uncertain and consumers hesitant, all of which is reflected in the lack of activity. It seems now that locally at least the coal strike has alleviated what might have been a very tough scrap situation. However, mills now seem to be getting some scrap at least and perhaps enough for their sharply reduced operations. Low phos seems to be about the easiest although turnings in small quantities are coming through.

•

ST. LOUIS—The movement of scrap iron to the mills in the St. Louis industrial district has been slowed down by the shortage of labor to gather and process the material. The result is that consumers are drawing on their piles, and the market is generally strong, except some specialties which are below ceiling prices.

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BIRMINGHAM—There is no definite trend in the market here. Strong demand continues for openhearth and blast furnace grades but practically none exists for electric furnace and foundry material. Reflecting lack of labor for scrap preparation, inventories on dealers' yards remains small.

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TORONTO—While scrap iron and steel receipts have been showing some improvement in the past two or three weeks, the supply situation remains tight and ceiling prices prevail on practically all materials. Steel mills are endeavoring to accumulate supplies for winter needs and while they have met with some success largely due to good tonnages coming from western Canada, stock piles are well below those of former years. Suspension of war activities has curtailed offerings of scrap from many plants and only small tonnages are appearing from these sources, although some good offerings are being made by War Assets Corp. Rural collections are speeding up but it is expected that supply from this quarter will be well below the average for the current season as most farm communities were fairly well cleaned during the war years. Cast scrap and stove plate are scarce with demand well in excess of supply. Dealers' yards are not heavily stocked and many are operating on hand-to-mouth offerings.

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages. Where asterisks are used on quotations below, this indicates a ceiling price to which must be added brokerage fee and adjusted freight.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bdld. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	$14.00 to 15.00
Short shov. turn.	17.00*
Mixed bor. and turn.	15.00*
Cast iron borings	16.00*
Hvy. break cast.	16.50*
No. 1 cupola	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Rolled steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	18.75*
Bundled mach. shop turn.	18.75*
Galv. bundles	16.75*
Mach. shop turn.	13.75*
Short shovels, turn.	15.75*
Cast iron borings	14.75*
Mix. borings & turn.	13.75*
Low phos. hvy. forge	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Rails 3 ft. and under	22.25*
Locomotive tires, cut	$22.75 to 23.25
Cut bolsters & side frames	20.25 to 20.75
Angles & splice bars	22.25*
Standard stl. car axles	24.00 to 24.50
No. 3 steel wheels	23.25*
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast.	20.00*
No. 1 agricul. cast.	20.00*
Hvy. breakable cast.	16.50*
RR. grate bars	15.25*
Cast iron brake shoes	15.25*
Stove plate	19.00*
Clean auto cast.	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 2 bundles	19.50*
Mach. shop turn.	$10.50 to 11.00
Shoveling turn.	12.50 to 13.00
Cast iron borings	11.50 to 12.00
Mixed bor. & turn.	11.50 to 12.00
Low phos. plate	22.00*
No. 1 cupola cast.	20.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Scrap rails	21.00*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$15.05*
No. 2 hvy. melting	15.05*
No. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovelings	12.05*
Machine shop turn.	10.05*
Mixed bor. & turn.	10.05*
Cl'n cast, chem. bor.	$13.06 to 14.15*

Truck delivery to foundry

Machinery cast.	21.00 to 23.51*
Breakable cast	21.57 to 21.87*
Stove plate	20.00 to 23.51*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	12.32*
Short shov. turn.	14.32*
Cast iron borings	13.32*
Mixed bor. & turn.	12.32*
Low phos. plate	19.32*
No. 1 cupola cast.	20.00*
Charging box cast.	19.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Automotive cast	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 2 bundles	18.75*
Mach. shop turn.	13.75*
Shoveling turn.	15.75*
Cast iron borings	$13.50 to 14.00
Mixed bor. & turn.	13.75*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Cast, charging box	19.00*
Hvy. axle forge turn.	18.25*
Low phos. plate	21.25*
Low phos. punchings	21.25*
Billet crops	21.25*
RR. steel wheels	23.25*
RR. coil springs	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting	$17.50*
Bundled sheets	17.50*
Mach. shop turn.	$9.00 to 9.50
Locomotive tires, uncut	18.00
Misc. std. sec. rails	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft. and under	21.50*
RR. springs	21.00
Steel car axles	21.00 to 21.50
Stove plate	19.00*
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.00*
Cast iron carwheels	20.00*
No. 1 mach'ery cast	20.00*
Breakable cast	16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00*
No. 2 hvy. melting	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	$9.50 to 10.00
Cast iron borings	11.00 to 11.50
Bar crops and plate	17.50 to 18.00
Structural and plate	17.50 to 18.00
No. 1 cast	20.00*
Stove plate	17.00
Steel axles	18.00*
Scrap rails	18.50
Rerolling rails	20.50*
Angles & splice bars	18.50 to 19.00
Rails 3 ft. & under	21.00*
Cast iron carwheels	16.50 to 17.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop. turn.	15.00*
Short shovel. turn.	17.00*
Cast iron borings	16.00*

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$15.33*
No. 2 hvy. melting	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	13.33
Mach. shop turn.	10.33
Mixed bor. & turn.	10.33
Shoveling turn.	12.33*
No. 1 cupola cast.	20.00*
Hvy. breakable cast	16.50*
Charging box cast	19.00*
Stove plate	19.00*
Clean auto cast	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	14.25*
Shoveling turn.	16.25*
Cast iron borings	14.25*
Cast iron borings	15.25
Mixed bor. & turn.	14.25*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00
No. 2 bundles	19.50*
Mach. shop turn.	14.50*
Short shovel.	16.50*
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	15.50*
Mixed bor. & turn.	14.50*
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting	$15.50 to $16.25
No. 1 hvy. melting	15.50 to 16.25
No. 2 hvy. melting	14.50 to 15.25
No. 2 bales	13.00 to 13.75
No. 3 bales	9.50 to 10.25
Mach. shop turn.	7.00
Elec. furn. 1 ft. und.	15.50 to 17.00
No. 1 cupola cast	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$13.00 to $14.00
No. 2 hvy. melting	12.00 to 13.00
No. 2 bales	11.00 to 12.00
No. 3 bales	9.00 to 10.00
Mach. shop turn.	4.50
No. 1 cupola cast	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	$10.00
No. 1 & No. 2 hvy. melting	10.00
Elec. furn. 1 ft. und.	14.00 to 15.00
No. 1 cupola cast	20.00*

Comparison of Prices . .

Advances over past week in Heavy Type; declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	Oct. 16, 1945	Oct. 9, 1945	Sept. 11, 1945	Oct. 17, 1944
Hot-rolled sheets	2.20	2.20	2.20	2.10
Cold-rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.70	3.70	3.70	3.50
Hot-rolled strip	2.10	2.10	2.10	2.10
Cold-rolled strip	2.80	2.80	2.80	2.80
Plates	2.25	2.25	2.25	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c-r strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tinplate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.25	2.25	2.25	2.15
Cold-finished bars	2.75	2.75	2.75	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (cents per pound)				
Bright wire	2.75	2.75	2.75	2.60
Wire nails	2.90	2.90	2.90	2.55
Rails: (dollars per gross ton)				
Heavy rails	$43.00	$43.00	$43.00	$40.00
Light rails	45.00	45.00	45.00	40.00
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$36.00	$36.00	$36.00	$34.00
Sheet bars	36.00	36.00	36.00	34.00
Slabs, rerolling	36.00	36.00	36.00	34.00
Forging billets	42.00	42.00	42.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.15	2.15	2.15	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron: (per gross ton)	Oct. 16, 1945	Oct. 9, 1945	Sept. 11, 1945	Oct. 17, 1944
No. 2 foundry, Phila.	$26.84	$26.84	$26.84	$25.84
No. 2, Valley furnace	25.00	25.00	25.00	24.00
No. 2, Southern, Cin'ti	25.44	25.44	25.44	24.44
No. 2, Birmingham	21.38	21.38	21.38	20.38
No. 2 foundry, Chicago†	25.00	25.00	25.00	24.00
Basic, del'd eastern Pa.	26.34	26.34	26.34	25.34
Basic, Valley furnace	24.50	24.50	24.50	23.50
Malleable, Chicago†	25.00	25.00	25.00	24.00
Malleable, Valley	25.00	25.00	25.00	24.00
L. S. charcoal, Chicago	42.34	42.34	42.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60¢ per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$16.25
Heavy melt'g steel, Phila.	18.75	18.75	18.75	14.50
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	16.50
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	11.25
Low phos. plate, Youngs'n	22.50	22.50	22.50	17.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$7.50	$7.50	$7.50	$7.00
Foundry coke, prompt	9.00	9.00	9.00	8.25
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin, Straits, New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943 issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Oct. 16, 1945	2.42471¢ per lb.	$24.61 per gross ton	$19.17 per gross ton
One week ago	2.42471¢ per lb.	$24.61 per gross ton	$19.17 per gross ton
One month ago	2.41571¢ per lb.	$24.61 per gross ton	$19.17 per gross ton
One year ago	2.21189¢ per lb.	$23.61 per gross ton	$15.75 per gross ton

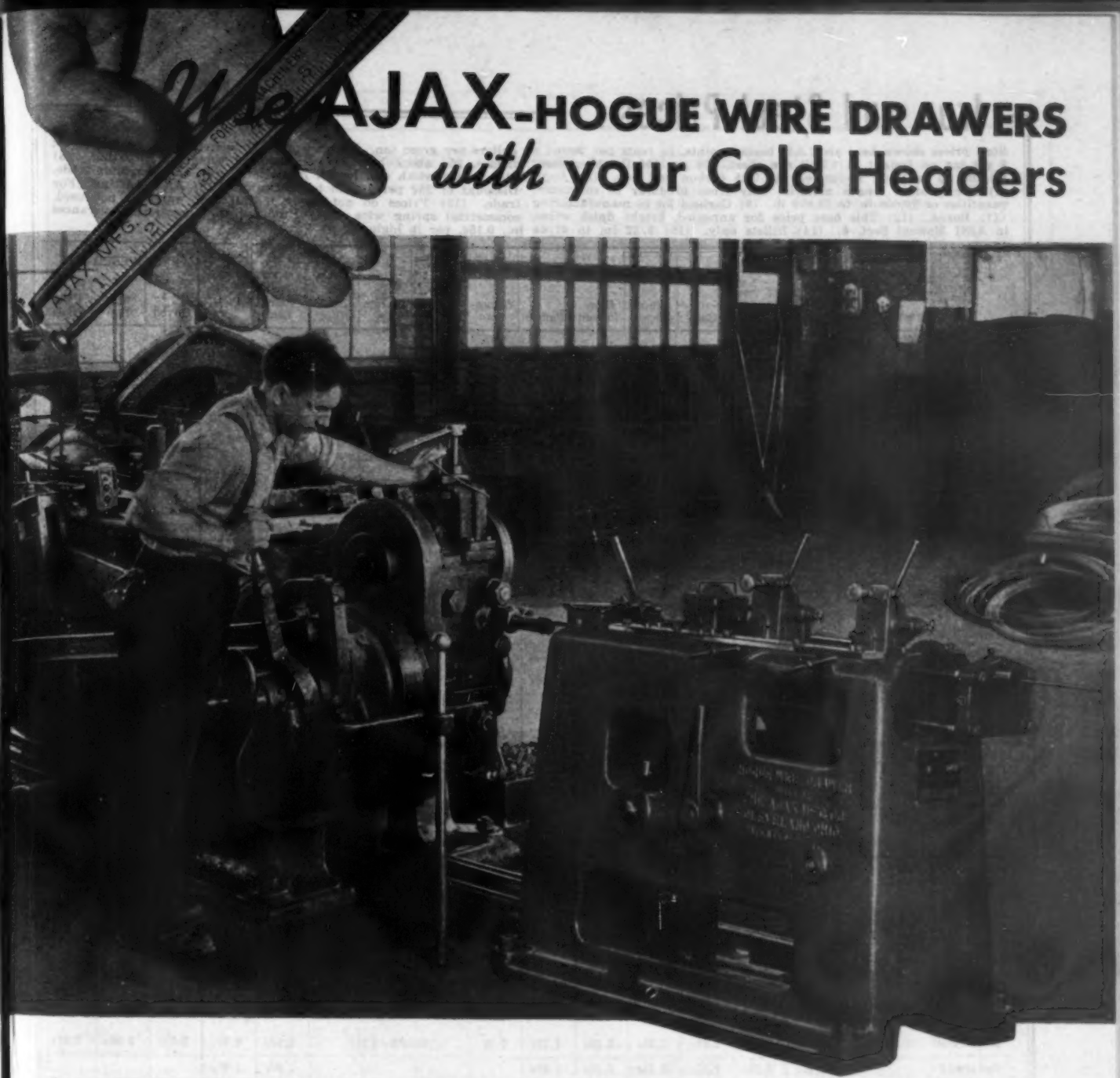
	FINISHED STEEL HIGH		FINISHED STEEL LOW		PIG IRON HIGH		PIG IRON LOW		SCRAP STEEL HIGH		SCRAP STEEL LOW	
1945	2.42471¢	July 3	2.21189¢	Jan. 2	$24.61	Feb. 20	$23.61	Jan. 2	$19.17		$19.17	
1944	2.30837¢	Sept. 5	2.21189¢	Oct. 5	$23.61		$23.61		19.17		$15.67	Oct. 24
1943	2.25513¢		2.25513¢		23.61		23.61		19.17		$19.17	
1942	2.26190¢		2.26190¢		23.61		23.61		19.17		19.17	
1941	2.43078¢		2.43078¢		$23.61	Mar. 20	$23.45	Jan. 2	$22.00	Jan. 7	$19.17	Apr. 10
1940	2.30467¢	Jan. 2	2.24107¢	Apr. 16	23.45	Dec. 23	22.61	Jan. 2	21.83	Dec. 30	16.04	Apr. 9
1939	2.35367¢	Jan. 3	2.26689¢	May 16	22.61	Sept. 19	20.61	Sept. 12	22.50	Oct. 3	14.08	May 16
1938	2.58414¢	Jan. 4	2.27207¢	Oct. 18	23.25	June 21	19.61	July 6	15.00	Nov. 22	11.00	June 7
1937	2.58414¢	Mar. 9	2.32263¢	Jan. 4	23.25	Mar. 9	20.25	Feb. 16	21.92	Mar. 30	12.67	June 8
1936	2.32263¢	Dec. 28	2.05200¢	Mar. 10	19.74	Nov. 24	18.73	Aug. 11	17.75	Dec. 21	12.67	June 9
1935	2.07642¢	Oct. 1	2.06492¢	Jan. 8	18.84	Nov. 5	17.83	May 14	13.42	Dec. 10	10.33	Apr. 29
1934	2.15367¢	Apr. 24	1.95757¢	Jan. 2	17.90	May 1	16.90	Jan. 27	13.00	Mar. 13	9.50	Sept. 25
1933	1.95578¢	Oct. 3	1.75836¢	May 2	16.90	Dec. 5	13.56	Jan. 3	12.25	Aug. 8	6.75	Jan. 3
1932	1.89196¢	July 5	1.83901¢	Mar. 1	14.81	Jan. 5	13.56	Dec. 6	8.50	Jan. 12	6.43	July 5
1931	1.99626¢	Jan. 13	1.86586¢	Dec. 29	15.90	Jan. 6	14.79	Dec. 15	11.33	Jan. 6	8.50	Dec. 29
1930	2.25488¢	Jan. 7	1.97319¢	Dec. 9	18.21	Jan. 7	15.90	Dec. 16	15.00	Feb. 18	11.25	Dec. 9
1929	2.31773¢	May 28	2.26498¢	Oct. 29	18.71	May 14	18.21	Dec. 17	17.58	Jan. 29	14.08	Dec. 3

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941 issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Use AJAX-HOGUE WIRE DRAWERS *with* your Cold Headers



. *for* Straight, Close Tolerance, Cold Headed Products

Long bolts and screws, for the aircraft and automotive industry, as well as a wide range of other headed products, can be produced with uniform straightness and with unvarying diameter from wire freshly drawn and coated on an Ajax-Hogue drawer. In addition to the improvement in the quality of the products produced there are many advantages offered by this drawer which substantially lower production costs.

1. Highest quality products can be produced from hot rolled stock instead of the more costly cold drawn wire.

2. The wire is freshly drawn and perfectly coated as it is fed to the header, thus eliminating spoilage due to foreign matter on the wire or prior deterioration of the wire.

3. Heading Die life is greatly increased, due to easier heading made possible by the low yield point of the freshly drawn wire and the uniform size and clean coating of the freshly drawn wire.

Ajax-Hogue Wire Drawers are built in five sizes with capacity from ¼ inch to ¾ inch diameter. Write for Bulletin No. 111 for more complete information.

THE AJAX MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND 17, OHIO
312 WESTMINSTER BUILDING · CHICAGO 3, ILLINOIS

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points, in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. (1) Mill run sheet, 10¢ per 100 lb under base; primes, 25¢ above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb to fabricators. (8) Also shafting. For quantities of 20,000 lb. to 39,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) This base price for annealed, bright finish wires, commercial spring wire. (13) Produced to dimensional tolerances in AISI Manual Sect. 6. (14) Billets only. (15) 9/32 in. to 47/64 in., 0.15c. per lb higher.

Basing Points	Pitts-burgh	Chicago	Gary	Cleve-land	Birm-ingham	Buffalo	Youngs-town	Spar-rows Point	Granite City	Middle-town, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	DELIVERED TO Detroit	New York	Phila-delphia
INGOTS															
Carbon, rerolling	($31.00 f.o.b. mill)														
Carbon, forging	$36	$36	$36	$36	$36	$36	$36								
Alloy	$45	$45				$45	(Bethlehem, Massillon, Canton, Coatesville—$45)								
BILLETS, BLOOMS, SLABS															
Carbon, rerolling	$38	$38	$38	$38	$38	$38	$38	$38				$48[14]	$38		
Carbon, forging	$42	$42	$42	$42	$42	$42	$42					$54[14]	$44		
Alloy	$54	$54				$54	(Bethlehem, Massillon, Canton—$56)						$56		
SHEET BARS	$36	$36		$36		$36	$36	$36	(Canton—$36)						
PIPE SKELP	1.90¢	1.90¢					1.90¢	1.90¢	(Coatesville—1.90¢)						
WIRE RODS[15]															
No. 5 to 9/32 in.	2.15¢	2.15¢		2.15¢	2.15¢	(Worcester—2.25¢)					2.40¢	2.65¢			
SHEETS															
Hot-rolled	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.30¢	2.20¢		2.75¢	2.30¢	2.44¢	2.37¢
Cold-rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 gage)	3.70¢	3.70¢	3.70¢		3.70¢	3.70¢	3.70¢	3.70¢	3.80¢	3.70¢		4.25¢		3.94¢	3.87¢
Enameling (20 gage)	3.45¢	3.45¢	3.45¢	3.45¢			3.45¢		3.55¢	3.45¢		4.10¢	3.55¢	3.81¢	3.77¢
Long ternes[2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
STRIP															
Hot-rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold-rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester—3.00¢)					2.90¢	3.16¢	
Cheparage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity cold-rolled	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester—3.35¢)					3.05¢	3.31¢	
TINPLATE															
Standard cokes, base box	$5.00	$5.00	$5.00						$5.10					$5.36	$5.32
Electro, tex 0.25 lb	$4.35	$4.35	$4.35												
Electro, tex 0.50 lb	$4.50	$4.50	$4.50						$4.60						
Electro, tex 0.75 lb	$4.65		$4.65						$4.75						
BLACKPLATE															
29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[11]			3.37¢
TERNES, MFG.															
Special coated, base box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25	(Duluth—2.35¢)			2.60¢	2.90¢	2.35¢	2.59¢	2.57¢
Rail steel[6]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢					2.60¢	2.90¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢	2.39¢	
Reinforcing (rail)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢	2.25¢		2.47¢
Cold-finished[8]	2.75¢	2.75¢	2.75¢	2.75¢		2.75¢		(Detroit—2.80¢)		(Toledo—2.90¢)				3.09¢	3.07¢
Alloy, hot-rolled	2.70¢	2.70¢				2.70¢	2.70	(Bethlehem, Massillon, Canton—2.70¢)					2.80¢		
Alloy, cold-drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
PLATES								(Coatesville and Claymont—2.25¢)							
Carbon steel[13]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢		2.25¢	2.25¢			2.60¢	2.80¢	2.47¢	2.44¢	2.30¢
Floor plates	3.50¢	3.50¢									3.85¢	4.15¢		3.88¢	3.82¢
Alloy	3.50¢	3.50¢			(Coatesville—3.50¢)						3.95¢	4.15¢		3.70¢	3.56¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem—2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 carbon	2.80¢			2.80¢			(Worcester—3.00¢)								
0.51 to 0.75 carbon	4.30¢			4.30¢			(Worcester—4.50¢)								
0.76 to 1.00 carbon	6.15¢			6.15¢			(Worcester—6.35¢)								
1.01 to 1.25 carbon	8.35¢			8.35¢			(Worcester—8.55¢)								
WIRE[9]															
Bright[12]	2.75¢	2.75¢		2.75¢	2.75¢		(Worcester—2.85¢)			(Duluth—2.80¢)		3.25¢			3.07¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire base														
Spring (high carbon)	3.35¢	3.35¢		3.35¢			(Worcester—3.45¢)					3.85¢			3.67¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

CORROSION AND HEAT RESISTANT STEELS

	Straight Chromium		Chromium Nickel			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt	21.25	20.40	15.725	16.15	19.125	23.375
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	21.25	20.40	15.725	16.15	19.125	23.375
Billets, P'gh, Chi, Canton, Newark, N. J., Watervliet, Syracuse, Balt	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Watervliet, Syracuse, Newark, N. J., Ft. Wayne	21.25	20.40	15.725	16.15	19.125	23.375
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne	25.00	24.00	18.50	19.00	22.50	27.50
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	25.00	24.00	18.50	19.00	22.50	27.50
Plates, P'gh, Middletown, Canton	29.00	27.00	21.50	22.00	26.50	30.50
Shapes, structural, P'gh, Chi	25.00	24.00	18.50	19.00	22.50	27.50
Sheets, P'gh, Chi, Middletown, Canton, Balt	30.00	34.00	26.50	29.00	32.50	31.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	23.50	21.50	17.00	17.50	24.00	33.00
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	30.00	28.00	22.00	22.50	32.00	42.00
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila	25.00	24.00	18.50	19.00	22.50	27.50
Wire flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	30.00	28.00	22.00	22.50	32.00	42.00
Rod, h-r, Newark, N. J. Syracuse	25.00	24.00	18.50	19.00	22.50	27.50
Tubing, seamless, P'gh Chi, Canton, (4 in. to 6 in.)	66.63	66.63	.....	63.30	.....	.....

SHELL STEEL

	per gross ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic openhearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; East Michigan, $3 higher.

Price Exceptions: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	per lb.
Field grade	3.30¢
Armature	3.65¢
Electrical	4.15¢
Motor	5.05¢
Dynamo	5.75¢
Transformer 72	6.25¢
Transformer 65	7.25¢
Transformer 58	7.75¢
Transformer 52	8.55¢

F.o.b. Granite City, add 10¢ per 100 lb. on field grade to and including dynamo. Pacific ports add 75¢ per 100 lb. on all grades.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

*(*Also Canton, O.)*	*base per lb.*
High speed	67¢
Straight molybdenum	54¢
Tungsten-molybdenum	57½¢
High-carbon-chromium*	43¢
Oil hardening*	24¢
Special carbon*	22¢
Extra carbon*	18¢
Regular carbon*	14¢

Warehouse prices east of Mississippi are 2¢ per lb. higher; west of Mississippi 3¢ higher.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb No. 1 O.H., gross ton	$43.00
Angle splice bars, 100 lb.	2.70

(F.o.b. Basing Points)	*per gross ton*
Light rails (from billets)	$45.00
Light rails (from rail steel)	44.00

	base per lb.
Cut spikes	3.25¢
Screw spikes	5.40¢
Tie plate, steel	2.30¢
Tie plates, Pacific Coast	2.45¢
Track bolts	4.75¢
Track bolts, heat treated, to railroads	5.00¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25¢.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	*Pacific Coast Basing Points†*
	base per keg	
Standard wire nails	$2.90	$3.40
Coated nails	2.90	3.40
Cut nails, carloads	3.85	....

	base per 100 lb.	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	base column	
Woven wire fence*	87	85
Fence posts, carloads	69	86
Single loop bale ties	66	91
Galvanized barbed wire**	72	82
Twisted barbless wire	72	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

CLAD STEEL

Base prices, cents per pound

	Plate	*Sheet*
Stainless-clad No. 304, 20 pct, f.o.b. Pittsburgh	18.00*	19.00
Nickel-clad 10 pct, f.o.b. Coatesville, Pa.	18.00	....
Inconel-clad 10 pct, f.o.b. Coatesville	25.00	....
Monel-clad 10 pct, f.o.b. Coatesville	24.00	....
Aluminized steel Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

*Includes annealing and pickling.

ALLOY EXTRAS

Alloy Steel	Basic Openhearth		Electric Furnace	
	Bars and Bar-strip	Billets, Blooms, and Slabs	Bars and Bar-strip	Billets, Blooms, and Slabs
NE 8600	0.55¢	$13.00	$1.15	$23.00
NE 8700	0.70	14.00	1.20	24.00
NE 9400	0.75	15.00	1.25	25.00
NE 9700	0.55	13.00	1.15	23.00
NE 9800	1.30	26.00	1.80	36.00
NE 9900	1.20	24.00	1.55	31.00

The extras shown are in addition to the base price of $2.70 per 100 lb on finished products and $54 per gross ton on semifinished steel, major basing points, as shown in table, opposite page, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. When acid openhearth is specified and acceptable, add to basic openhearth alloy differential 0.25¢ per lb for bars and bar-strip and $5 per gross ton for billets, blooms and slabs.

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills

(F.o.b. Pittsburgh only on wrought pipe) base price—$200.00 per net ton

Steel (buttweld)

	Black	Galv.
⅛-in.	63½	51
¼-in.	66½	55
1-in. to 3-in.	68½	57½

Wrought Iron (buttweld)

⅛-in.	24	3½
¼-in.	30	10
⅜-in. and ½-in.	34	16
¾-in.	38	18½
1-in.	37½	18

Steel (lapweld)

2-in.	61	49½
2½-in. and 3-in.	64	52½
3½-in. to 6-in.	66	54½

Wrought Iron (lapweld)

2-in.	30½	12
2½-in. to 3½-in.	31½	14½
4-in.	33½	18
4½-in. to 8-in.	32½	17

Steel (butt, extra strong, plain ends)

⅛-in.	61½	50½
¼-in.	65½	54½
⅜-in. to 3-in.	67	57

Wrought Iron (same as above)

⅛-in.	25	6
¼-in.	31	12
⅜-in. to 2-in.	38	19½

Steel (lap, extra strong, plain ends)

2-in.	59	48½
2½-in. and 3-in.	63	52½
3½-in. to 6-in.	66½	56

Wrought Iron (same as above)

2-in.	33½	15½
2½-in. to 4-in.	39	22½
4½-in. to 6-in.	37½	21

On buttweld and lapweld steel pipe jobbers are granted a discount of 5 pct. On l.c.l. shipments prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lapweld and one point lower discount, or $2 a ton higher on all buttweld.

BOILER TUBES

Seamless steel and lapweld commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots.

	Seamless Cold-Drawn	Hot-Rolled	Lapweld, Hot-Rolled
2 in. O.D. 13 B.W.G.	15.03	13.04	12.38
2½ in. O.D. 12 B.W.G.	20.21	17.54	16.58
3 in. O.D. 12 B.W.G.	22.48	19.50	18.35
3½ in. O.D. 11 B.W.G.	28.37	24.62	23.15
4 in. O.D. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb or ft and over	Base
30,000 lb or ft to 39,999 lb or ft	5 pct
20,000 lb or ft to 29,999 lb or ft	10 pct
10,000 lb or ft to 19,999 lb or ft	20 pct
5,000 lb or ft to 9,999 lb or ft	30 pct
2,000 lb or ft or 4,999 lb or ft	45 pct
Under 2,000 lb or ft	65 pct

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger, f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect 3 pct tax on freight rates.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

	Percent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 pct additional discount.

Stove Bolts	*Consumer*
Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets

(7/16 in. and smaller)

	Percent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws	*Consumer Percent Off List*
Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Div. certifies in writing the consumers need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	Base price per short ton
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, cents per lb, ton lots.

Copper, electrolytic, 150 and 200 mesh	21½¢ to 23½¢
Copper, reduced, 150 and 200 mesh	20½¢ to 25½¢
Iron, commercial, 100 and 200 mesh 96 + % Fe	12½¢ to 15¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	4¢
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots	63¢
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢
Aluminum, 100 and 200 mesh	*25¢
Antimony, 100 mesh	30¢
Cadmium, 100 mesh	$1.40
Chromium, 100 mesh and finer	$1.25
Lead, 100, 200 & 300 mesh	11½ to 15¢
Manganese	65¢
Nickel, 150 mesh	51½¢
Solder powder, 100 mesh	8½¢ plus metal
Tin, 100 mesh	58¾¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.60
Molybdenum powder, 99%, in 200-lb kegs, f.o.b. York, Pa., per lb	$2.60
Under 100 lb	$3.00

*Freight allowed east of Mississippi.

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$7.50*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	9.00
Foundry, Byproduct	
Chicago, del'd	13.75
Chicago, f.o.b.	13.00
New England, del'd	14.65
Kearny, N. J., f.o.b.	13.05
Philadelphia, del'd	13.28
Buffalo, del'd	13.40
Portsmouth, Ohio, f.o.b.	11.50
Painesville, Ohio, f.o.b.	12.15
Erie, del'd	13.15
Cleveland, del'd	13.20
Cincinnati, del'd	13.25
St. Louis, del'd	14.25
Birmingham, del'd	10.90

*Hand drawn ovens using trucked coal permitted to charge $8.60 per ton plus transportation charges.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis	$68.55
First quality, Pa., Md., Ky., Mo., Ill.	54.45
First quality, New Jersey	59.45
Sec. quality, Pa., Md., Ky., Mo., Ill.	49.40
Sec. quality, New Jersey	54.15
No. 1 Ohio	45.75
Ground fire clay, net ton	8.05

Silica Brick

Pennsylvania and Birmingham	$54.45
Chicago District	62.45
Silica cement, net ton (Eastern)	9.55

Chrome Brick	*Per Net Ton*
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)*

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-B Ann.
**Philadelphia	$3.518	$4.872[5]	$4.768[a]	$3.922	$4.772	$3.605	$3.668	$3.822	$4.172	$5.816	$5.866	$7.072	$8.172
New York	3.58	4.613[5]	5.110	3.974[9]	4.772	3.788	3.758	3.953	4.203	5.888	6.008	7.103	8.203
Boston	3.744	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.244	6.012	7.062	7.194	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.584	3.758	3.802	4.152	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.265	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.85	5.00	6.65	6.65	7.99
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.737[17]	3.687	3.687	3.637	3.937	5.837	6.987	6.987	7.937
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.558	3.35	3.85	5.808	6.858	6.65	7.75
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.85	5.60	6.65	6.65	7.75
Detroit	3.45	4.50	5.004	3.70	4.85[217]	3.609	3.661	3.45	3.90	5.93	6.93	6.959	8.053
Cincinnati	3.425	4.475[2]	4.825[5]	3.675	4.711	3.661	3.691	3.611	4.111	5.95	7.00	7.011	8.261
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.831[17]	3.697	3.697	3.647	4.131	5.931	7.031	7.031	8.131
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.85	5.60	6.65	6.65	7.99
St. Paul	3.50	4.46	5.257[4]	3.86	5.102[17]	3.813[3]	3.813[3]	3.763[3]	3.481	5.91	6.99	7.391	8.481
Omaha	3.385	5.443	5.408[4]	4.215	....	4.165	4.165	4.115	4.543	....	....	....	....
Indianapolis	3.518	4.568	4.918	3.768	4.741	3.63	3.63	3.58	4.00	5.93	6.93	6.98	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.53	....	....	....	....
Memphis	3.965[7]	4.86	5.268	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058[a]	5.079	5.386	4.308	....	4.158	4.158[a]	4.108[a]	4.729	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.473[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.813[18]	4.85	4.85	4.40	5.883	8.284	9.434	9.334	10.484
San Francisco	4.85[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.8514	4.3514	4.1514	5.433	8.334	9.434	9.434	10.484
Seattle	4.85[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.883		9.434		
Portland	4.85[11]	6.80[4]	5.75[4]	4.75[11]	....	4.85[11]	4.45[11]	4.45[11]	5.633	8.334	9.434	8.334	9.434
Salt Lake City	4.53[017]	....	6.17[13]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	6.00	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1499 lb; strip, extras on all quantities; bars, 1500 lb base.

NE ALLOY BARS: 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 199 lb. (7) 400 to 1499 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 2999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb and over. (15) 1000 lb and over. (16) 1500 lb and over. (17) 2000 lb and over. (18) 3500 lb and over.

(a) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271¢ for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

PIG IRON PRICES

BASING POINT* PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	$25.50	$26.00	$26.50	$27.00	.....
Birdsboro	25.50	26.00	26.50	27.00	$30.50
Birmingham	20.00	21.38	.....	26.00	.....
Buffalo	24.00	25.00	25.50	26.00	30.50
Chicago	24.50	25.00	25.00	25.50	.....
Cleveland	24.50	25.00	25.00	25.50	.....
Detroit	24.50	25.00	25.00	25.50	.....
Duluth	25.00	25.50	25.50	26.00	.....
Erie	24.50	25.00	25.50	26.00	.....
Everett	25.50	26.00	26.50	27.00	.....
Granite City	24.50	25.00	25.00	25.50	.....
Hamilton	24.50	25.00	25.00	.....	.....
Neville Island	24.50	25.00	25.00	25.50	.....
Provo	22.50	23.00	.....	.....	.....
Sharpsville [1]	24.50	25.00	25.00	25.50	.....
Sparrows Point	25.50	26.00	.....	.....	.....
Steelton	25.50	.....	.....	.....	30.50
Swedeland	25.50	26.00	26.50	27.00	.....
Toledo	24.50	25.00	25.00	25.50	.....
Youngstown	24.50	25.00	25.00	25.50	.....

DELIVERED PRICES† (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$ .50	$26.00	$26.50	$27.00	$27.50	.....
Boston	Birdsboro-Steelton	4.02	.....	.....	.....	.....	$34.52
Brooklyn	Bethlehem	2.50	28.00	28.50	29.00	29.50	.....
Brooklyn	Birdsboro	2.92	.....	.....	.....	.....	33.42
Canton	Cleveland	1.39	25.89	26.39	26.39	26.89	.....
Canton	Buffalo	3.19	.....	.....	.....	.....	33.09
Cincinnati	Birmingham	4.06	24.06	25.44	.....	.....	.....
Cincinnati	Hamilton	1.11	.....	.....	25.11	.....	.....
Cincinnati	Buffalo	4.40	.....	.....	.....	.....	34.80
Jersey City	Bethlehem	1.63	27.63	27.63	28.63	28.63	.....
Jersey City	Birdsboro	1.94	.....	.....	.....	.....	32.44
Los Angeles	Provo	4.95	27.45	27.95	.....	.....	45.91
Los Angeles	Buffalo	15.41	.....	.....	.....	.....	.....
Mansfield	Cleveland & Toledo	1.94	26.44	26.94	26.94	27.44	.....
Mansfield	Buffalo	3.36	.....	.....	.....	.....	33.86
Philadelphia	Swedeland	.84	26.34	26.84	27.34	27.84	.....
Philadelphia	Birdsboro	1.24	.....	.....	.....	.....	31.74
San Francisco	Provo	4.95	27.45	27.95	.....	.....	45.91
San Francisco	Buffalo	15.41	.....	.....	.....	.....	.....
Seattle	Provo	4.95	27.45	27.95	.....	.....	45.91
Seattle	Buffalo	15.41	.....	.....	.....	.....	.....
St. Louis	Granite City	.50	25.00	25.50	25.50	26.00	.....
St. Louis	Buffalo	7.07	.....	.....	.....	.....	37.57

*Maximum per gross ton, established by OPA February 14, 1945. †Prices do not reflect 3 pct tax on freight.

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50¢ a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, $33.00 and $34.00, respectively. Newberry Brand of Lake Superior charcoal iron $39.00 per g.t., f.o.b. furnace, by order L 39 to RPS 10. Apr. 11, 1945, retroactive to Mar. 7, 1945. Delivered to Chicago, $42.34. High phosphorus iron sells at Lyles, Tenn., at $28.50.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50¢ a ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); Phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; Manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. Effective Mar. 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron and bessemer ferrosilicon up to and including 14.00 pct silicon covered by RPS 10 as amended Feb. 14, 1945. Silvery iron, silicon 6.00 to 6.50 pct. C/L per g.t., f.o.b. Jackson, Ohio—$30.50; f.o.b. Buffalo—$31.75. Add $1.00 per ton for each additional 0.50 pct Si. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for prices of comparable analysis.

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	141.00
Less ton lots (packed)	148.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	36c.
L.c.l. lots	38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.

Carload, bulk	34c.
L.c.l. lots	35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carloads, f.o.b. shipping point with freight allowed.

	Eastern Zone	Central Zone	Western Zone
50% Si	6.65c.	7.10c.	7.25c.
75% Si	8.05c.	8.20c.	8.75c.
80-90% Si	8.90c.	9.05c.	9.55c.
90-95% Si	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

Silvery Iron, Silicon 14.01 to 14.50 per cent, $45.50 per G. T. f.o.b. Jackson, Ohio. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%. Covered by MPR 405.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	3.35c.	3.50c.	3.65c.
2000 lb-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.
2000 lb. to carload	6.30c.
Less ton lots	6.55c.

Ferrochrome

(65-72% Cr. 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10%	13.00c.	13.40c.	14.00c.
62-66% Cr, 5-7% C	13.50c.	13.90c.	14.50c.

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2c. per lb. to regular low-carbon ferrochrome price schedule. Add 2c. for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5c. per lb. to regular high-carbon ferrochrome price schedule.

Low-Carbon Ferromanganese

Contract prices per lb. of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, Eastern Zone. Add 0.25c. for spot sales.

	Carloads, Bulk	Ton Lots	Less Ton
0.10% max. C, 1 or 2% max. Si	23.00c.	23.40c.	23.65c.
0.15% max. C, 1 or 2% max. Si	22.00c.	22.40c.	22.65c.
0.30% max. C, 1 or 2% max. Si	21.00c.	21.40c.	21.65c.
0.50% max. C, 1 or 2% max. Si	20.00c.	20.40c.	20.65c.
0.75% max. C, 7.00% max. Si	16.00c.	16.40c.	16.65c.

Ferrochrome Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60 per cent contained chromium. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	8.25c.	8.55c.	8.95c.
Ton lots	8.75c.	9.25c.	10.75c.
Less ton lots	9.00c.	9.50c.	11.00c.

Ferromanganese Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66 per cent contained manganese. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	6.05c.	6.30c.	6.60c.
Ton lots	6.65c.	7.55c.	8.55c.
Less ton lots	6.80c.	7.80c.	8.80c.

Calcium—Manganese—Silicon

Contract prices per lb. of alloy, lump size, f.o.b. shipping point, freight allowed to destination.

16-20% Ca, 14-18% Mn, 53-59% Si. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carloads	15.50c.	16.00c.	18.05c.
Ton lots	16.50c.	17.35c.	19.10c.
Less ton lots	17.00c.	17.35c.	19.60c.

Calcium Metal

Eastern zone contract prices per lb. of metal, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. Add 0.9c. for Central Zone; 0.49c. for Western Zone.

	Cast	Turnings	Distilled
Ton lots	$1.80	$2.30	$5.00
Less ton lots	2.30	2.80	5.75

Chromium—Copper

Contract price per lb. of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi River. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2c. for spot sales.

Shot or ingot	45c.

Ferroboron

Contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	$1.20	$1.2075	$1.229
Less ton lots	1.30	1.3075	1.329

Manganese—Boron

Contract prices per lb. of alloy, f.o.b. shipping point, freight charges allowed. Add 5c. for spot sales.

75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron

Spot and contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination.

15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, Balance Ni.

	Eastern Zone	Central Zone	Western Zone
11,200 lb. or more	$1.90	$1.9125	$1.9445
Ton lots	2.00	2.09125	2.0445
Less ton lots	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, Standard grade lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungstein, 10,000 lb. or more	$1.90
Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.	
Open hearth	$2.70
Crucible	$2.80
Primos	$2.90
Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal	$1.50
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5	$1.10
Silicaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)	
Carload lots	25c.
2000 lb. to carload	26c.
Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)	
Carload lots	58c.
2000 lb. to carload	59c.
Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis	
No. 1	87.5c.
No. 6	60c.
No. 79	45c.
Bortram, f.o.b. Niagara Falls	
Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb.	
2000 lb. lots	$2.25
Under 2000 lb. lots	$2.30
Ferrotitanium, 40-45%, 0.10%C. max. f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained Ti	$1.23
Less ton lots	$1.25
Ferrotitanium, 20-25%, 0.10%C. max., ton lots, per lb. contained titanium	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15%-20%, 6-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y. freight allowed East of Mississippi River, north of Baltimore and St. Louis, per carload	$142.50
Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo.	95c.
Calcium molybdate, 40-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo	80c.
Molybdenum oxide briquets, 48-52% Mo f.o.b. Langeloth, Pa., per lb. contained Mo	80c.
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo	80c.
Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales	
Carload lots	14c.
Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per lb. of alloy	
Carload, bulk	4.6c.
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk	5.75c.
Ton lots	7.25c.
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.	
Car lots	3.00c.
Ton lots	3.75c.
Less ton lots	9.25c.

$1.90

$2.70
$2.80
$2.90

$1.50

$1.10

25c.
26c.

58c.
59c.

87.5c.
60c.
45c.

45c.
50c.

$2.25
$2.30

$1.23
$1.25

$1.35
$1.40

142.50

$58.50

$75.00

95c.

80c.

80c.

80c.

14c.

4.6c.

5.75c.
7.25c.

8.00c.
8.75c.
9.25c.

.90

.70
.80
.90

.50

.10

5c.
6c.

c.
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25
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23
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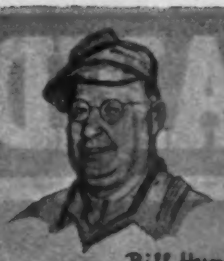
c.

DRAWING A

Ray Myers,
Maintenance Foreman
25 years service



Bill Hynes,
Tool maker
23 years service

ELECTRICWELD TUBING

PUTS STEEL AT YOUR SERVICE IN MANY USEFUL WAYS

The conversion of long strips of sturdy steel into light, strong, durable tubing by the electricweld process demonstrates anew the adaptability of this most versatile of our metals to an infinite variety of equipment, articles and accessories.

The alphabet of applications of electric-welded tubing runs from "A" for automotive parts (of which there are fifty-seven) to X-Ray equipment and back through bicycles, irrigation lines—adapted in war to invasion lines for conveying water, gasoline and oil to the fighting fronts—and on to office and playground equipment, furniture and washing machines.

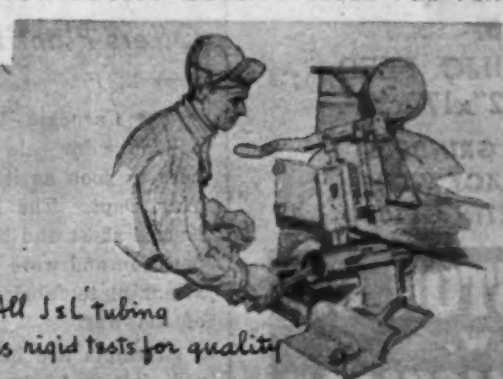
Steel tubing affords great strength with little weight. It can be fashioned in all manner of shapes by many methods of manufacture. It will readily help make up the deficiency of appliances and machines that war's demands for steel denied us. It offers a challenge to the imagination and ingenuity of designers, engineers, and manufacturers to employ it in the creation of new and useful and attractive articles of steel to make our daily living safer, more comfortable and convenient.

JONES & LAUGHLIN STEEL CORPORATION

J&L STEEL

PITTSBURGH 30, PENNSYLVANIA

CONTROLLED QUALITY STEEL FOR PEACE



All J&L tubing passes rigid tests for quality

DRAWING AND SKETCHES MADE AT J&L ELECTRICWELD TUBE PLANT, OIL CITY, PENNSYLVANIA, BY ORISON MACPHERSON

TUBES OF STEEL

Swift and accurate is Electricweld method of forming steel tubing. Coils of flat steel strip are fed into the forming rolls (see illustration) and move along until they are perfectly cylindrical in shape. Then they pass under two rotating electrodes, where, as the butted edges are pressed into contact, electric current flows through the steel, welding the seam and forming a solid wall; strong, yet light. Controlled Quality strip from J&L Strip-Sheet mill assures correct wall thickness, concentricity, and accurate size in the finished tubing.

Steel tubing's sheer beauty outranks that of any other building section, allowing architects wide latitude in combining utility with a distinctive decorative note in the design of all manner of buildings, from residences and apartments to hotels, office buildings, stores and schools. Metal working plants in America today use steel tubing to achieve results in beauty and usefulness undreamed of a few years ago. Tubing can be bent, beaded, expanded, swaged, spun, flanged, upset, grooved, fluted, flattened and otherwise altered in cross section to meet various design requirements.

Steel shell containers to protect ammunition in transit were produced in J&L Electricweld Tube Plant in Oil City, Pa., at the rate of 400,000 per month.

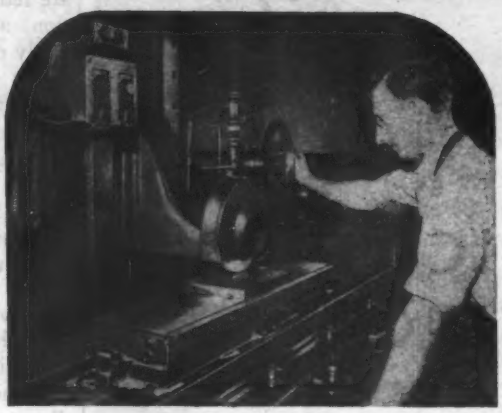
"Steel-Bellied snakes" our troops called the electric-welded steel tubing, adapted to invasion pipe lines, twisting over the land to convey gasoline, oil and water to the fighting fronts. Steel tubing, in 20 ft. sections, 4 in. in diameter, was coupled with a special coupling that enabled men to lock two lengths together in 1 minute. A light truck could carry 1000 ft. of tubing. Two men could handle a length and 20 miles of pipe could be laid in a day. In Africa alone, 1000 miles of this invasion line were in operation. The 4-in. line could deliver 210,000 gals. a day. The 6-in. portable line had a capacity of 400,000 gals.

First pipe for invasion line came from J&L Electricweld plant. Peace-time possibilities are for increased use in irrigation of farms, orchards, truck gardens, as a means to controlled food production, as well as to offset normally arid conditions.

Tubing for furniture, bicycles, conveyors, handles, and playground equipment will now again be produced in large quantities at the J&L Electricweld plant.

57 tubular members in an automobile include air intake; oil filler and breather tube; radiator inlet and outlet tube; manifold tube; accelerator shaft and pedal tubing; exhaust and tail pipe, propeller shaft and torque tubes. Accessories include tire pumps and grease guns.

GRAND RAPIDS



YES

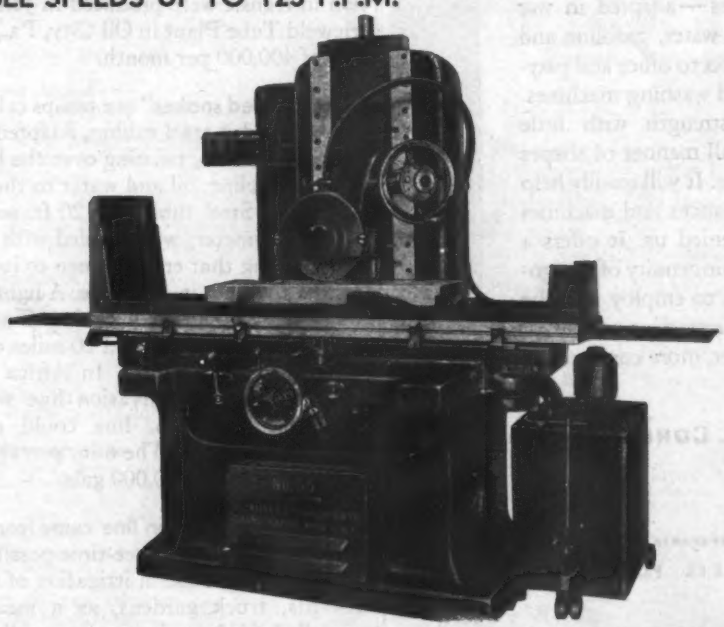
This Grand Rapids No. 55 Hydraulic Surface Grinder has been kept busy grinding base plates for cannon trays

BUT

today it is busy on peacetime production where extreme accuracy is required.

THESE MACHINES FEATURE

ONE PIECE COLUMN AND BASE CASTING
PATENTED MOVEMENT OF WHEEL HEAD
BIJUR ONE SHOT LUBRICATING SYSTEM
TWO USABLE SPINDLE SPEEDS
PORTABLE MOTOR DRIVEN COOLANT SYSTEM
TABLE SPEEDS UP TO 125 F.P.M.



NO. 55 GRAND RAPIDS HYDRAULIC FEED SURFACE GRINDER. CAPACITY 12"x17"x36".

IF YOU ARE INTERESTED IN SURFACE GRINDERS WHICH COMBINE TOOL ROOM ACCURACY WITH PRODUCTION SPEEDS, SEND FOR BULLETIN GL101

GALLMEYER & LIVINGSTON CO.

200 STRAIGHT AVE., S.W.

GRAND RAPIDS 4 MICHIGAN

Old Time Merchant Blast Furnace Sold

Youngstown, Ohio

• • • Sale of Struthers Iron & Steel Co., operator of the Anna Furnace, oldest merchant stack in the Mahoning Valley, to the J. H. Hillman interests of Pittsburgh, was reported recently. Simultaneously, William C. Holzworth, president of Struthers Iron & Steel Co. since its incorporation in 1927, announced his resignation from that post. He will continue to serve on the company's board of directors.

"The company could not operate on prevailing prices of pig iron and increasing difficulties in plant operation prompted the sale," Mr. Holzworth said in announcing the sale of a large or major part of his interests in the plant to the Hillman interests, which control Pittsburgh Coke & Chemical Co. and the Pittsburgh Steel Co.

Struthers Iron & Steel, which is to retain its present name, will be headed by R. M. Marshall and T. R. Kirkpatrick of Pittsburgh Coke & Chemical.

"Old Annie," as the furnace has been called, was built in 1869 by the Struthers Iron Co., an enterprise promoted by John Struthers, associated with T. W. Kennedy, John Stambaugh and John Stewart. Daniel B. Stambaugh and T. W. Stewart later became owners of Brown, Bonnell Iron Co., and still later of the Struthers Furnace Co. until in 1927 it was taken into the Struthers Iron & Steel Co.

Because of the coal shortage, the furnace at the plant was banked early last week but will resume operations as soon as possible. According to reports, company policy for the present at least will be unchanged, having no immediate connection with any other individual steel company.

Offers Plant for Sale

Farrell, Pa.

• • • Carnegie-Illinois Steel Corp. will offer for sale its ordnance plant here as soon as it is released by the War Dept. The buildings formerly housed sheet and tin mills of the corporation and were converted for tank armor plate fabrication at the outset of the war.

Attempts are being made by Farrell civic and labor leaders to secure a new industry to use the buildings.

EC&M Control has Outstanding Advantages for DIESEL-ELECTRIC Cranes

Washington Iron Works takes advantage of the inherent safety and quick response in operation of series-wound brakes and the simplicity and better characteristics of series motors for the hoists of their Portal Cranes.

The EC&M Wright Dynamic Lowering Circuit Controller prevents heavy peak loads on the Diesel-Generator, because—

1 All line current passes through the brake coil on the first point lowering to insure quick brake release with minimum power.

2 TIME-CURRENT Relays retard the rate of acceleration of heavy loads in hoisting, yet allow faster operation with light loads.

Specify EC&M Control for your cranes to get these exclusive advantages.

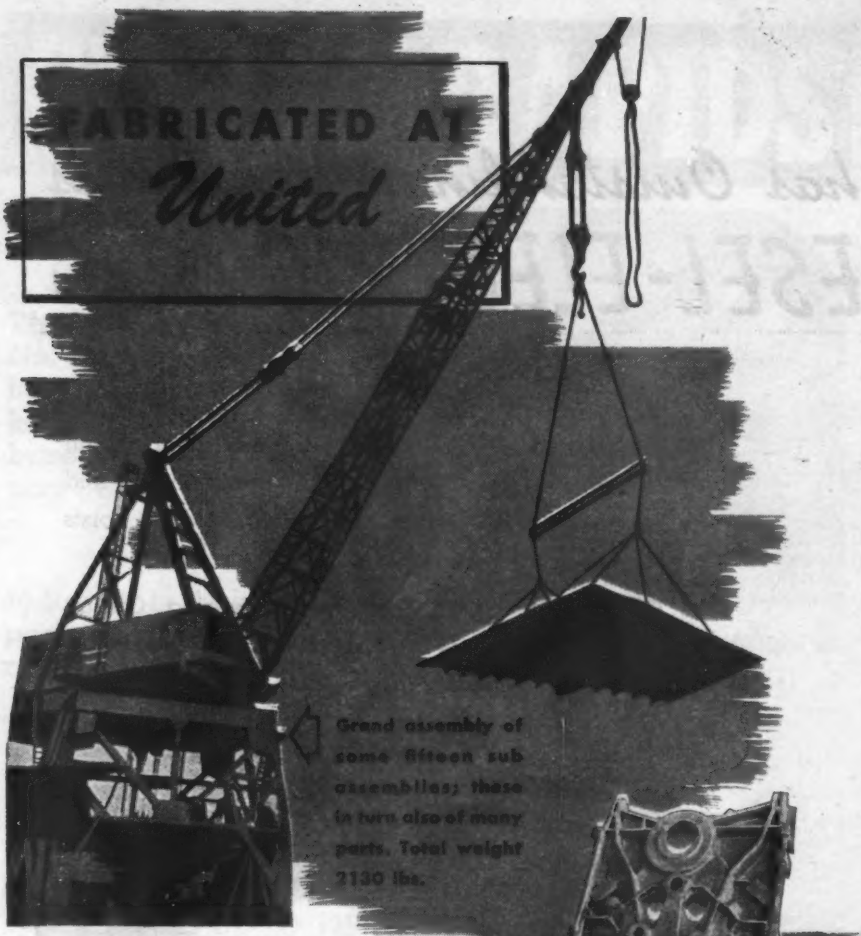
THE ELECTRIC CONTROLLER AND MANUFACTURING CO.

2698 EAST 79TH STREET CLEVELAND 4, OHIO

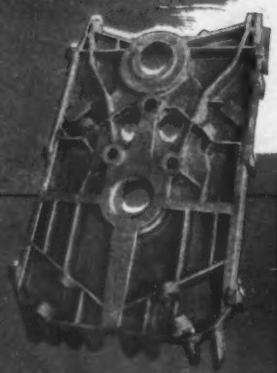
Portal Crane by Washington Iron Works, Seattle, Wash. equipped with EC&M Control and Type WE Brakes.

Operator's Cab (Seat Removed) shows efficient arrangement of Master Switches and Clutch Pilot-levers

Hoist unit—Magnetic Control Panels and Type H Alloy Grid Resistors (overhead).



Grand assembly of some fifteen sub assemblies; these in turn also of many parts. Total weight 2130 lbs.



BACK VIEW

FRONT VIEW

United engineers and craftsmen welcome assignments like the complicated crane deck shown above. They have the "know how" born of 32 years' experience—the plant capacity and facilities to handle difficult work with precision and dispatch.

Your product may lend itself to welding, all or in part. It may involve large or complicated weldments or close precision work. Be that as it may, United is equipped to serve you. Give United that opportunity.

Support the Victory Bond Drive

Engineering service.

Quotations on submitted drawings.

THE UNITED WELDING CO.
MIDDLETOWN, OHIO

WELDING FABRICATORS OF MODERN DESIGNS

Wartime Statistics On World's Coal and Coke Industry Released Now

Pittsburgh

• • • **During the war years, the Bureau of Mines was unable to release the International Coal Trade, dealing with statistical data on coal in foreign countries. This week, for the first time since May 1942, data have been released covering the intervening period. Also information on mining operations of the United Kingdom, France, Canada and Brazil, showing production, employment, imports and exports of the coal mining industries of these countries.**

Coal exports from the United Kingdom declined drastically between 1939 and 1944. Using the total coal exports in 1939 as a base, the index number for 1944 is 6.4.

TABLE I

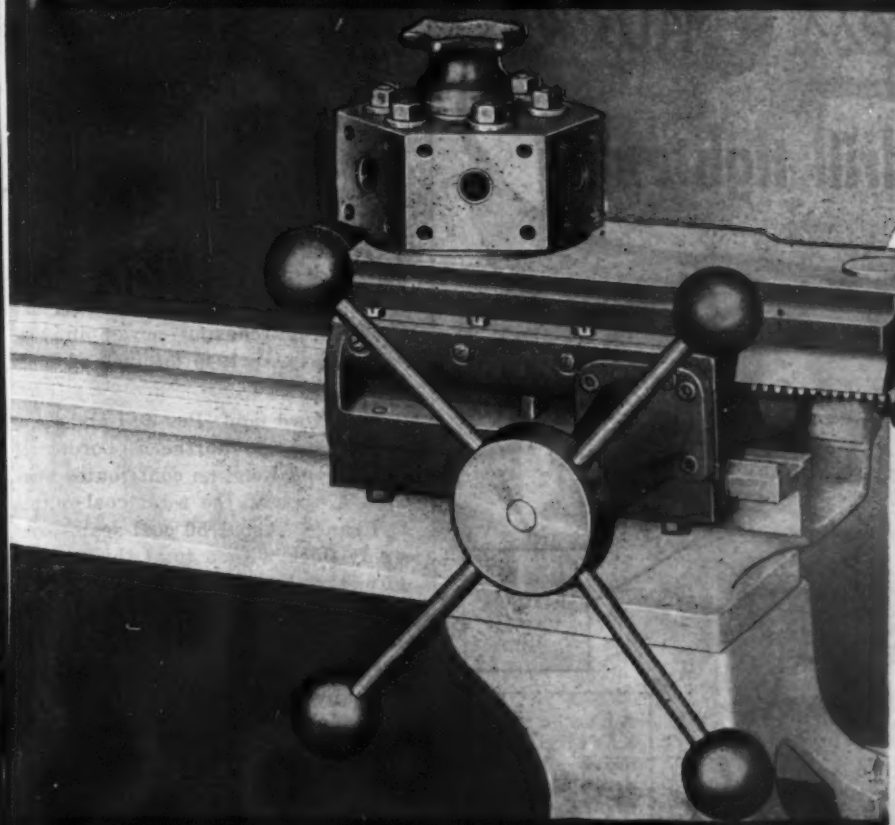
Coal Exports from the United Kingdom 1939-44

Year	Long tons	Index numbers (1939=100)
1939	38,917,090	100.0
1940	19,646,256	53.2
1941	5,083,971	13.8
1942	3,574,271	9.7
1943	3,522,871	9.5
1944	2,377,073	6.4

According to a recent preliminary report received from representatives of the Bureau of Mines, the coal industry of France at the end of 1944 was in a critical position from the standpoint of production. The mines had been operated without maintaining the equipment, and much of it was worthless. Mining supplies and equipment were difficult if not impossible to obtain. The total coal production, including anthracite, bituminous coal, and lignite, amounted to only 26,602,000 metric tons (in 1944) or less than half of the peak production of 55,000,000 tons in 1929. The average production from 1931 to 1935 was 48,417,000 tons, and the 1944 production represented a reduction of 45 pct from that average.

Employment in the French coal industry has not declined drastically compared with 1937 when 227,340 persons were employed. Incomplete statistics show 222,820 persons employed underground and on the surface in 1944, with a further drop in January and February, 1945. This

Logan A NAME TO REMEMBER WHEN YOU THINK OF **BETTER** LATHES

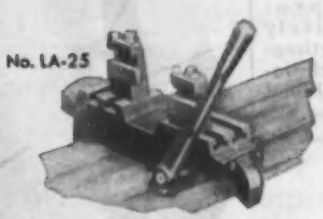


NEW TURRET ASSEMBLY

BUILT BY *Logan* FOR *Logan* LATHES

Heavier, More Versatile, More Accurate, Easier to Handle

No. LA-29



No. LA-25

DOUBLE TOOL POST CROSS SLIDES

For use in connection with the Turret Assembly. No. LA-29 is interchangeable with the Compound Rest. No. LA-25 also fits the bed of all Logan Lathes.

THE new Logan Turret Assembly is now standard equipment on Logan Turret Lathes, and is also available as a separate assembly. Designed by Logan for Logan Lathes, this assembly is interchangeable with the tailstock, providing an efficient, economical means of converting a Logan Screw Cutting Lathe for turret lathe production. Built to Logan standards of precision workmanship, and heavier in its overall construction, this new Logan Turret Assembly assures smoother and more accurate cutting with longer tool life. Its hexagonal block design permits mounting tools on face of block as well as in standard bored holes, thus providing more versatility in operation. Pilot wheel operation permits easier and more positive control of the cutting tool. The turret lock insures greater rigidity and increased accuracy, especially on heavier cuts. The assembly is furnished rough bored for either ⅝" or ¾" finish bore turret holes. It is also available with a lever operated turret for more rapid action on light work.

BRIEF SPECIFICATIONS... Distance across turret head flats, 5⅛"... Center of tool holes to top of slide 1⅛"... Six positions with adjustable stops... self-indexing... maximum stroke of turret 4⅛" ... adjustable gibs on slide.

G-1

LOGAN ENGINEERING CO.

CHICAGO 30, ILLINOIS

New Keyless Chuck
does its own drill tightening

THE TURNER CHUCK Saves Time!

Hardened bearing steel roller jaws grip the drill without chewing or scoring.

Grip is automatically and progressively strengthened with increased load pressure

Ball bearings increase life.

Absolutely KEYLESS. No more chewed drill shanks. No more time wasted looking for keys.

The Turner Chuck is self-energizing. Tightens itself by the action of the drill.

Drill will not slip in use. Chuck is automatically self-centering and drill runs true without hand adjustments.

SPEED RECONVERSION
Write Now!

TURNER BROTHERS

TURNER GAUGE GRINDING COMPANY
HILTON, DRAYTON & CORTEZ · FERNDALE 20, MICHIGAN

THE SINGLE STYLE TURNER CHUCK IS AVAILABLE IN:

4 DRILL CAPACITIES

A-1/32 to 1/16 DRILL
B-1/16 to 1/8 DRILL
C-1/8 to 1/4 DRILL
D-1/4 to 1/2 DRILL

3 BODY SIZES

15/16 x 1¾
15/16 x 1¾
1½ x 2½
2¼ x 3¾

represents a decrease of approximately 2 pct.

Among the things that contribute to the unrest prevailing among the French coal miners are lack of proper food required to perform the hard work of mining, the high cost of living compared with the wages paid to the miner and agitation to have the coal mines nationalized.

Although the annual wages of underground workers increased approximately 73 pct between 1940 and 1943, it is doubtful if the mine worker had as much purchasing power in 1943 as in the year 1940 because of inflation.

The Nord and Pas-de-Calais coal basin on the northern border of France and Belgium contributes more than 67 pct of the total coal output in France. About 50 coal seams over six ft thick with a total thickness of 40 meters have been recognized. The content of volatile matter in the coal varies from 7 to 30 pct.

The Moselle Basin obtained from Germany in 1918 and annexed by Germany in 1940, also known as the Lorraine Basin, is the western extension of the Saar Basin in Germany. This basin includes 75 coal seams with a total thickness of about 400 ft. The output of two tons per manshift underground is much greater than in any other coal basin in France, and the average production cost per ton is the lowest in France.

The most important of the smaller basins, Loir or St. Etienne, ranks sixth in coal reserves and third in production. Four beds are about 6 ft. thick and 30 small seams vary from ½ to one yd in thickness. The coal is generally hard, grading into an anthracite in places.

These three basins supplied about 77 pct of France's total coal production in 1942. The Bourgogne, Gard, Herault, and Tarn Basins account for almost all of the remainder.

Production of coal in Canada in 1943 was 5 pct less than in 1942, whereas coke output increased 8 pct as indicated in Table II. The drop in production was due to a decline in bituminous coal output, lignite output in 1943 having increased approximately 13 pct over the previous year. Saskatchewan was the only province that increased its total production in 1943. In Alberta, sub-bituminous coal and lignite output increased 8 and 6 pct, respectively, but bituminous coal production declined 9 pct. Although the coke output in the western provinces in 1943 was ap-

Why ARISTOLOY STEELS

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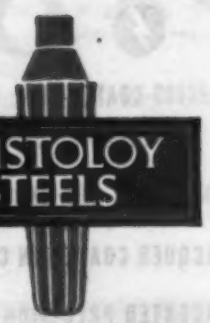

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proximately the same as in 1942, the eastern provinces showed a drop of 5 pct, and Ontario an increase of 18 pct.

TABLE II

Canadian Coal and Coke, 1942-43
Metric Tons

	1942	1943
Coal and lignite		
Production	17,113,978	16,201,379
Imports	22,627,563	25,499,852
Exports	739,882	1,007,061
Apparent consumption	38,996,759	40,694,170
Coke		
Production	2,970,647	3,218,308
Imports	703,569	835,584
Exports	40,518	43,777
Apparent consumption	3,633,698	4,011,113

Canadian imports of coal, lignite, and coke in 1943, totaling 26,335,436 metric tons, all originating in the United Kingdom and the United States, represented an increase of 13 pct over the imports in 1942. Although anthracite imports fell off approximately 9 pct, bituminous coal increased 18 pct, coke 19 pct, and lignite 41 pct. Imports from the United Kingdom increased only 0.5 pct; those from the United States, 13 pct.

Production of coal in Brazil, amounting to 1,046,975 metric tons in 1939, increased annually until 1943 when the output was almost twice as much as in 1939, as shown in Table III. In 1944, however, production declined approximately 9 pct from 1943. In Rio Grande do Sul, where 64 pct of the total output in 1944 was produced, the reduction in output was attributed to difficulties caused by the application of a new labor code; in Santa Catarina, which supplied 32 per cent of the 1944 output, producers blamed the reduced output on an inadequate supply of coastwise vessels to transport the coal to markets in the industrial area of Rio-São Paulo.

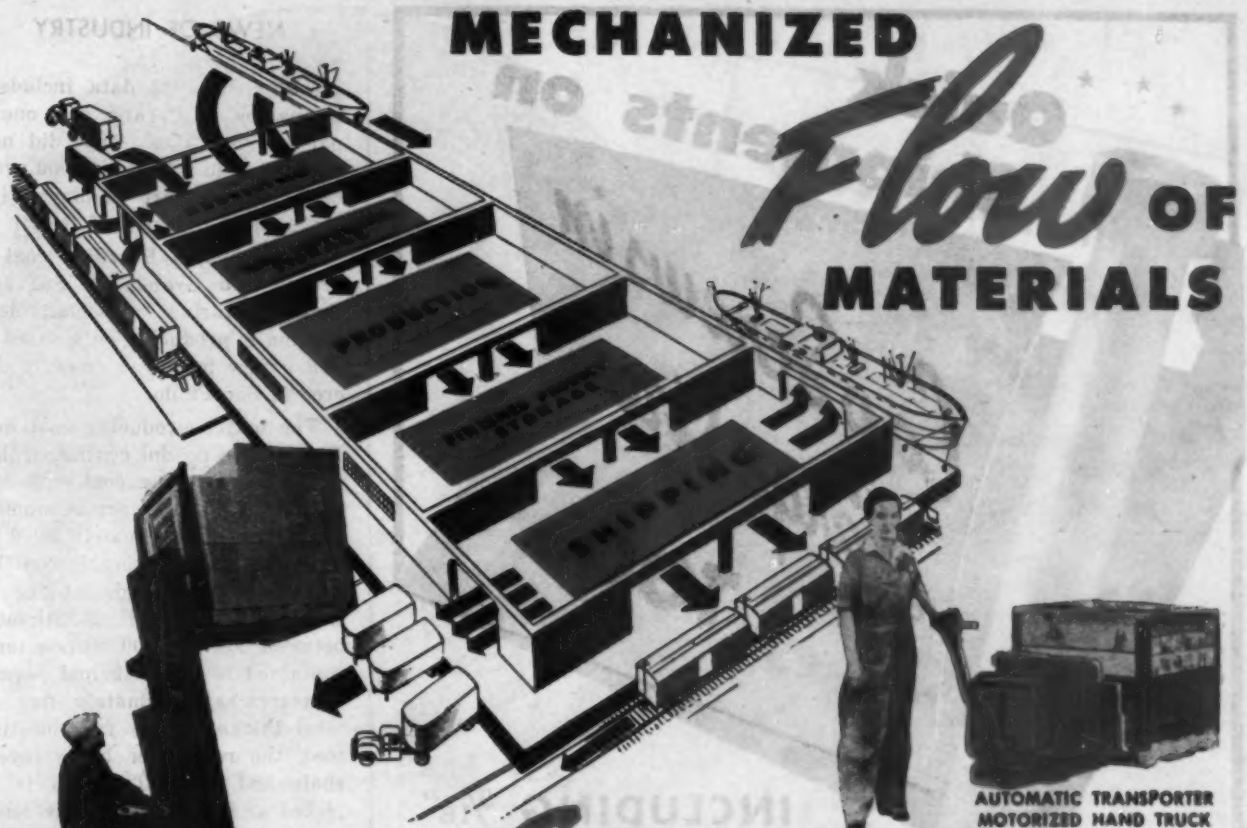
TABLE III

Production of Coal in Brazil

	Metric Tons
1939	1,046,975
1940	1,336,301
1941	1,408,079
1942	1,758,741
1943	2,034,311
1944	1,855,591

Production in São Paulo and Paraná made very substantial increases in 1944 as compared with 1943, but

MECHANIZED *Flow* OF MATERIALS



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While processing motions usually add value to a product, *handling motions add only to its cost.*

You can lower your unit costs if you will team up AUTOMATIC's battery-powered Fork Truck with the war-tested "TRANSPORTER," AUTOMATIC's *service-proved,* motorized hand truck,—and apply AUTOMATIC's Engineered Materials Handling Methods.

AUTOMATIC's completely Engineered Materials Handling Service will do these things for you:

1. *Eliminate* costly manual handling.
2. *Reduce damage* to materials handled.
3. *Increase storage capacity* by safe, vertical stacking of materials to rooftop.
4. *Simplify inventory* control.
5. *Increase productivity* by reducing labor fatigue.
6. *Reduce accidents.*

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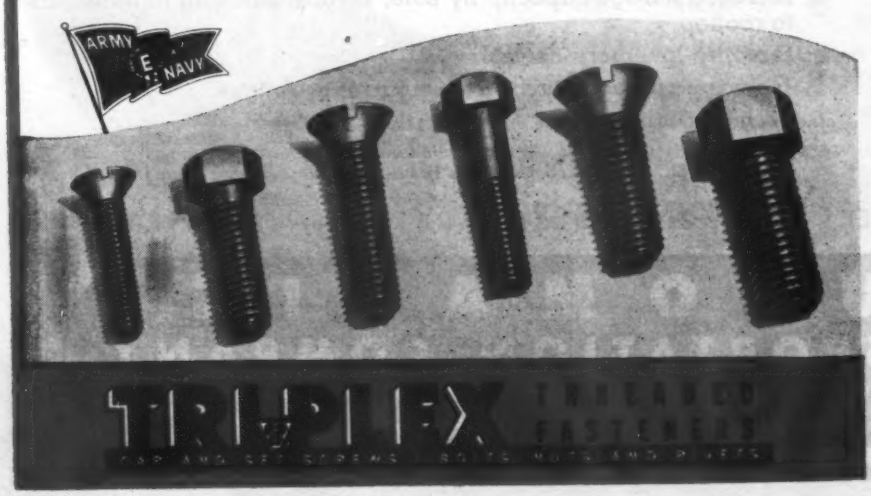

actually the 1944 data include four companies in Paraná and one company in São Paulo that did not report in 1943. About 15,000 workers of all classes are employed in the coal mining industry of Brazil.

The principal Brazilian coal fields are in Rio Grande do Sul and in Santa Catarina. A small field in Paraná is producing on a small scale, and a new field was recently discovered in São Paulo.

The major producing coal field in Rio Grande do Sul contains sub-bituminous, non-coking coal with an ash content of 40 to 42 pct as mined, and averaging approximately 8000 B.t.u. The potential recoverable coal in the Santa Catarina field, reputed to be the largest in Brazil, is estimated as between 200 and 300 million tons, all contained in one principal seam that measures approximately five ft in total thickness, 2½ ft consisting of coal, the remainder being layers of shale and clay. The coal is hand-picked underground and, as delivered to the surface, generally runs 30 to 35 pct ash and 4 to 7 pct sulphur.

A large modern coal washery has been constructed and is now operating at Tubarao, 30 to 40 miles inland from the ports of Imbituba and Laguna. This plant is designed to produce approximately 300,000 tons of washed fines containing from 14 to 16 pct ash, and 400,000 tons of steam coal with an ash content of 25 to 30 pct.

The São Paulo field is estimated to contain a few hundred thousand tons of semianthracite coal that is high in ash and sulphur.

The coal field in Paraná, with a rail connection of about 40 miles to the city of São Paulo, is estimated to contain from eight to ten million tons of a non-coking and high ash-content coal. Transportation difficulties are delaying the development of this field.

To Continue Tool Service

Detroit

• • • Publication of "Tooling Information Service," carried on during the war by the now-dissolved Automotive Council for War Production, is being continued by the Automotive Tool & Die Mfrs. Assn. at Detroit.

During the war the tooling information service won high praise for the work it did in making available tooling facilities known to buyers all over the country.

BOTH are Permite Castings. The one pictured at the top was cast in sand, and weighs 4 lbs. 6 oz. The other is a permanent mold casting of the same part, and weighs only 3 lbs. 10 oz. Because the initial order called for a limited quantity, sand castings were supplied. But later orders, in greatly increased quantities, justified a change to permanent mold.

The Permite customer gained the saving of lighter weight per casting, and the other advantages that obtain when the quantity and the nature of the casting design permit the use of permanent molds.

Close tolerances in the casting process are achieved with Permite permanent molds. There is less "dead" metal to pay for and to remove by machining. Uniformly accurate dimensions mean faster machining, faster production, lower production costs.

Permite modern foundries are equipped to give you high quality aluminum alloy castings of the type which best meets your needs. Prepare for increasing postwar competition by consulting with Permite engineers on your castings requirements. Your inquiry will receive prompt attention.

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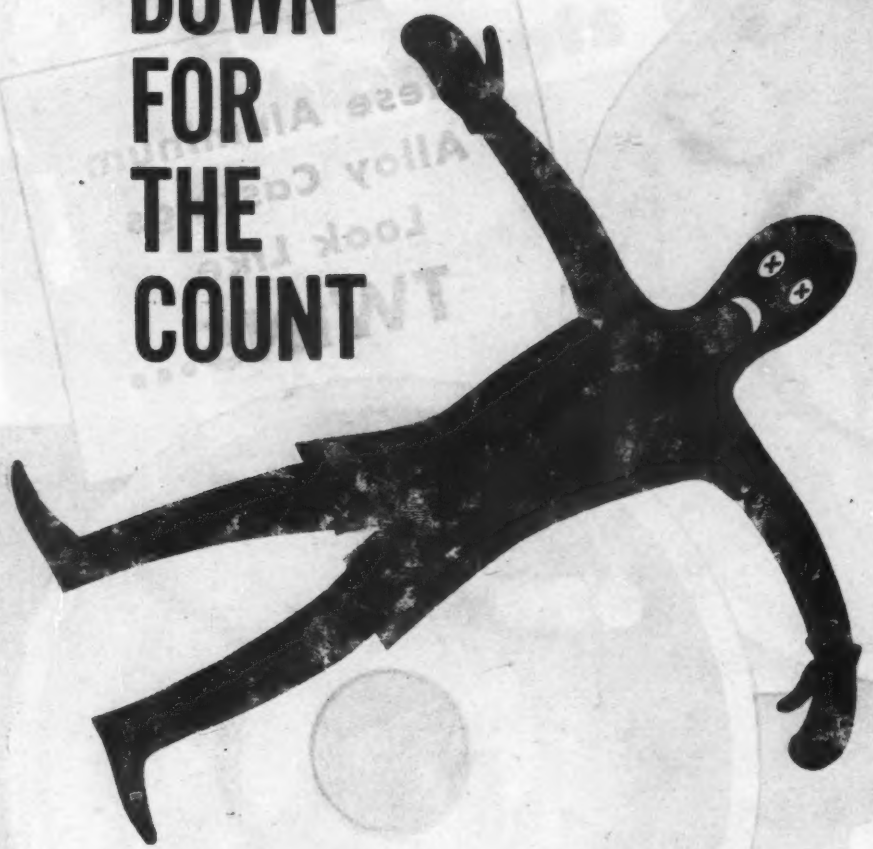
PERMITE ALUMINUM ALLOY CASTINGS

DOWN FOR THE COUNT



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SERVICE REPRESENTATIVES IN 88 CITIES

CED Issues Report In Study of Problem For Increased Employment

New York

• • • **The establishment of a President's Commission on Full Employment and of a Joint Congressional Committee on Full Employment has been recommended by the research committee of the Committee for Economic Development as a means of developing, coordinating and integrating a program of measures to deal with the many problems involved in achieving a prosperous and stable economy.**

The recommendation is contained in a statement of national policy on the problems of attaining and maintaining high levels of productive employment in a free economy. In this statement entitled "Toward More Jobs and More Freedom," the research committee sets forth the nature of the problems and defines what it believes are the responsibilities of management, labor and government in arriving at solutions to these problems.

Declaring that we shall not again be "victimized by a nostalgia for normalcy," the study examines the new position in which war experience has placed our free enterprise system and suggests both goals and steps in answer to questions of "where do we go from here?" In this regard, the statement is concerned more with the basic problems of attaining and maintaining high productive employment in the years ahead than it is with purely transitional problems.

The private sector of our economy will have to provide the great bulk of the 7 to 10 million new peacetime jobs needed, the committee points out, inasmuch as it has provided 90 pct of total employment in the past and there is little likelihood of any important change in that ratio in the future. With agriculture, a declining source of jobs, and industrial employment diminishing now that the war is over, most of the needed job expansion must come in the field of trade and service occupations. The 30 pct to 45 pct increase in the output of goods and services as compared with 1940 necessary to provide these additional jobs "will call for a free flow of ideas and willingness on the part of hundreds of thousands of enterprisers and millions of investors to risk billions of dollars," the committee declares.

The committee views this expansion

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as an objective in which business, labor and government share joint interest and responsibility. While this joint interest centers in a high and rising standard of living the committee considers its roots to be in a steadily expanding productivity with the fruits of such productivity passed along as lower prices and higher wages for a constantly expanding output of goods and services.

"Both employers and labor leaders," says the report, "profit in the long run in pursuit of this common goal by opposing restrictive policies that lower output and raise costs."

Business employers owe it to their workers as well as to their stockholders to operate their enterprises at a profit, the report declares, since "without profits the businessmen, as job-makers, cannot provide expanding job opportunities or stability of existing employment." Similarly, says the committee, labor leaders in their collective bargaining, "share a joint responsibility with management for maintaining high employment and productive efficiency upon which the long run advantage of all depends." The committee concludes that "only by increasing the total output of goods and services can the 'real income' of all be increased."

In examining the role of Government in this joint responsibility for promoting high level productive employment, the committee sees a need for planning positively for competition in contrast to many previous attempts to plan against competition by price maintenance schemes, freezing of trade practices, etc. If we are to encourage the creation of new businesses and the expansion of existing ones, the people, acting through government, must take the steps necessary to develop fiscal, monetary, taxation, and other public policies which go to create the "climate" in which all enterprises must operate, the committee says.

The proposed Joint Congressional Committee on Full Employment would be composed of the ranking members of Senate and House Committees which now deal with major problems affecting the national economy. This committee also would have a working staff of experts and would receive reports from the President's Commission in order to develop a coordinated Government program for high level employment.

The CED research committee views the combined challenge to business,

(CONTINUED ON PAGE 142)

MILLING

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Combined metal removal operations—performed simultaneously or in programmed sequence —and at the push of a button.

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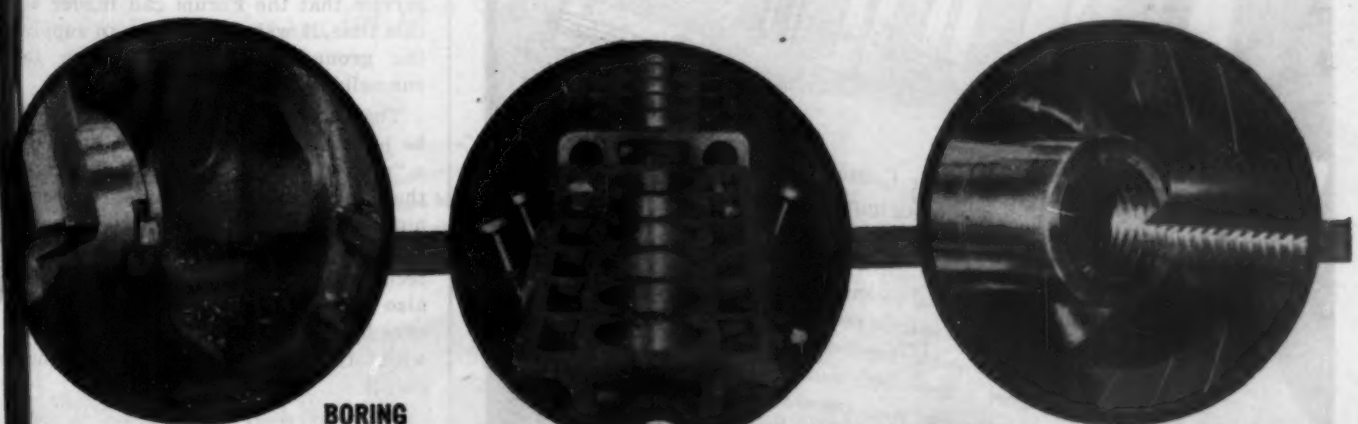

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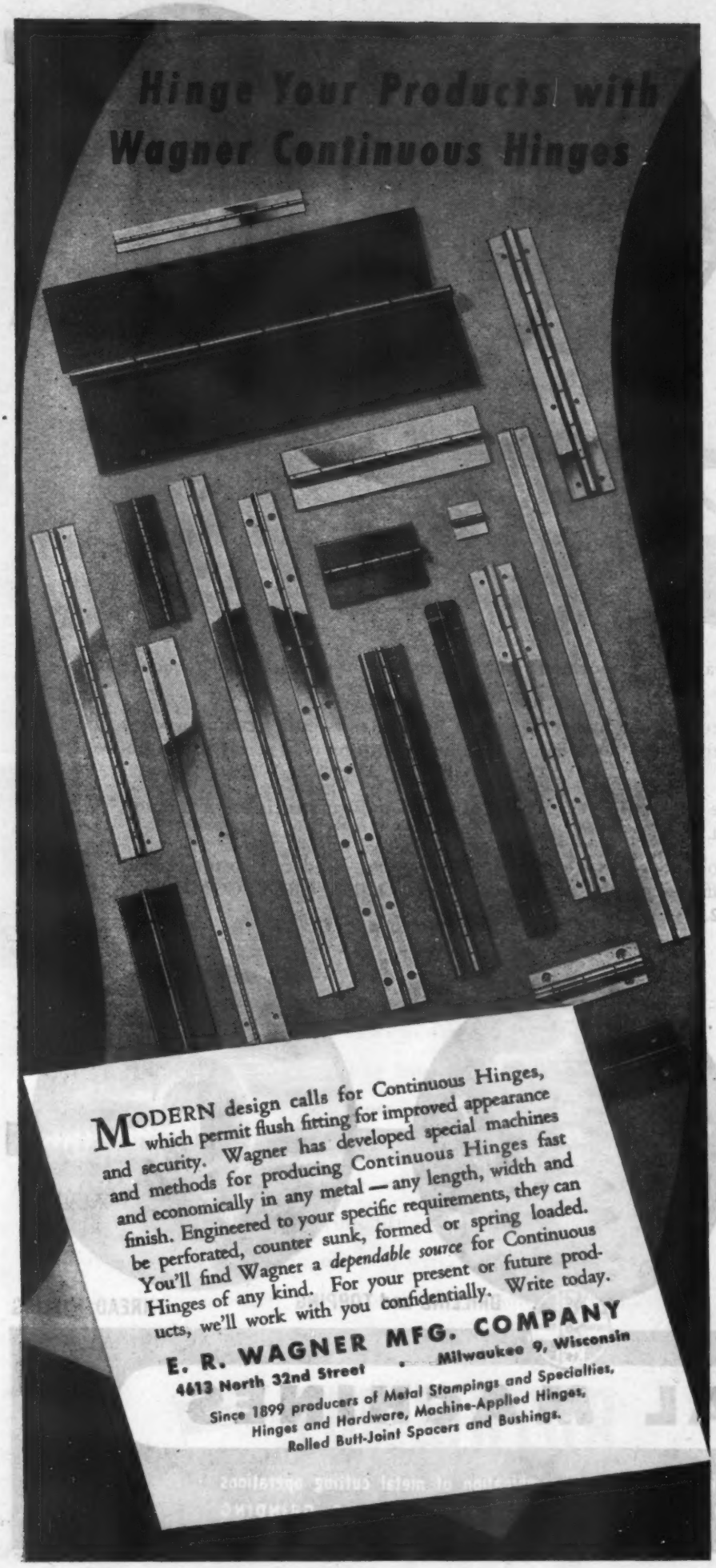
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(CONTINUED FROM PAGE 138)

labor and government in achieving a high level stable economy as a "dual date with destiny. We must strive to attain and maintain abundant productive employment, but at the same time we also must preserve and strengthen economic and political freedom."

If the challenge is approached in a spirit of realism and cooperation by all groups concerned, the committee sees no conflict between these two vital objectives. Rather it views them as complementary.

Porcelain Enamel Inst. Forum to Be Resumed Following 4-Yr Lapse

Pittsburgh

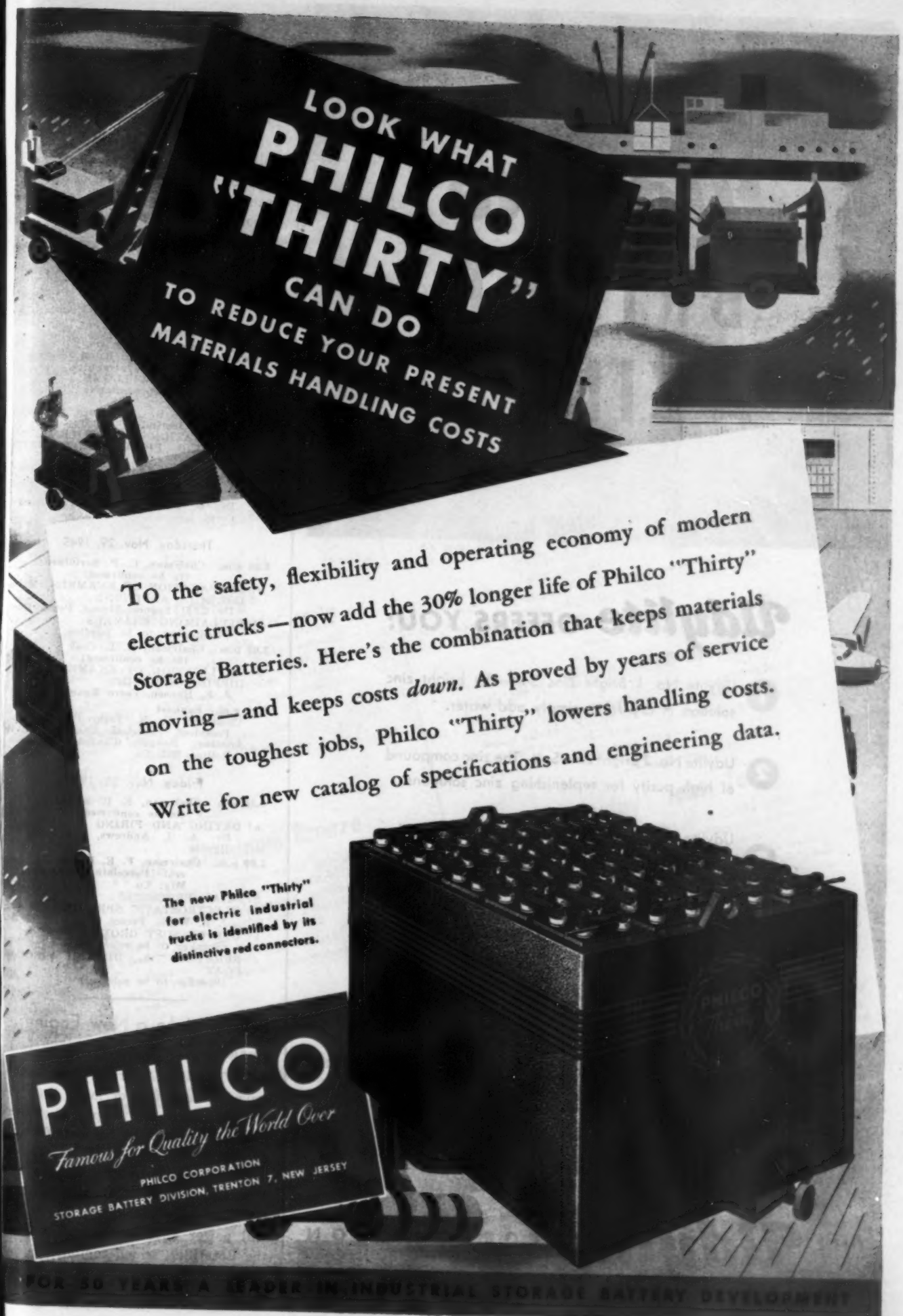
• • • **The Porcelain Enamel Institute** has announced that following a lapse of four years the Forum is again to be resumed. It will be held this year at Ohio State University, Columbus, Ohio, Nov. 28, 29, and 30.

In the past four years, the personnel and facilities of the porcelain enameling industry have been almost entirely devoted to war production. As a result, many plants have lost a large part of their skilled personnel, and those remaining have become "rusty" on enameling processing. In many cases, new factory organizations will have to be built from the ground up. For that reason, the most valuable service that the Forum can render at this time, it was felt, will be to supply the ground work for a return to enameling operations.

The 3-day meeting in Columbus will be built around the idea of providing a "refresher" course, which will stress the fundamentals of enameling techniques. Presentation of the discussions will be made by outstanding technical men of the industry, who also have had long practical experience in solving the problems connected with the operation of enameling plants.

Attendance at the Forum is not limited to members of the institute and their employees, but is open to all companies and individuals engaged in or connected with the porcelain enamel industry.

To make the Forum self-supporting in a larger measure, registration fees this year have been fixed at $10.00 for the 3-day session, $7.50 for two days, and $5.00 for one day. A full record of the proceedings of the Forum will be published in book form and a copy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will be included as part of the registration fee.

The speaker for the banquet on Nov. 29 will be the "Old Iron Master," Mr. Bennett Chapple, of the American Rolling Mill Co.

Following is an outline of the program, although it is to be confirmed in some details, as noted:

Program for Seventh Annual Forum

Ohio State University, Columbus, Ohio
Nov. 28, 29, 30, 1945

Wednesday, Nov. 28, 1945

10.00 a.m. Registration

1.30 p.m. General Session
Chairman, Professor R. M. King, Ohio State University

a) ADDRESS OF WELCOME
University Representative
RESPONSE
President R. H. Turk, Porcelain Enamel Institute

b) PREPARATION OF SHEET METAL: CLEANING, PICKLING, NEUTRALIZING
B. T. Sweely, Chicago Vitreous Enamel Prod. Co.

c) NICKEL DIPPING
Dr. G. H. McIntyre, Ferro Enamel Corp.

Thursday, Nov. 29, 1945

9.30 a.m. Chairman, C. P. Scripture (to be confirmed)

a) PREPARATION OF ENAMELS: MILLING, MILL ADDITIONS
Dr. G. H. Spencer-Strong, Pemco Corp.

b) RECLAIMING ENAMELS
(Speaker to be selected)

2.00 p.m. Chairman, H. L. Cook (to be confirmed)

a) APPLICATION OF ENAMELS: DIPPING, SPRAYING
J. E. Hansen, Ferro Enamel Corp.

8.00 p.m. Banquet
Chairman, R. H. Turk, Pemco Corp. President, Porcelain Enamel Institute
Speaker, Bennett Chapple, American Rolling Mill Co.

Friday, Nov. 30, 1945

9.30 a.m. Chairman, E. H. Shands (to be confirmed)

a) DRYING AND FIRING
Dr. A. I. Andrews, University of Illinois

2.00 p.m. Chairman, F. E. Hodek, Jr., General Porcelain Enameling & Mfg. Co.

SPECIAL PROCESSES:

a) ELECTROSTATIC SPRAYING
J. B. Willis, Pemco Corp.

b) USE OF SOFT GROUND COAT
(Speaker to be selected)

c) SPRAYING vs. DIPPING GROUND COAT
(Speaker to be selected)

Bell to Make a New Engine

Buffalo

• • • The Bell Aircraft Corp. has received a contract for more than $1,000,000 worth of 5-hp one-cylinder gasoline engines to be manufactured at its Burlington, Vt., plant. The order was placed by the Warren City Mfg. Co. of Warren, O., wholly owned Graham-Paige subsidiary. The motor will power a farm implement called the Rototiller, which combines in one operation the work of a plow and harrow.

Here's What
KENNAMETAL
HAS DONE
that other cutting tools
COULD NOT DO!
STYLE 11MD
STYLE 11
STYLE 1
on Sandy Iron Castings
Turned cast iron piston trunks—21½" diameter x 45" long—high in silicon, manganese, and carbon; very sandy surface; chilled around port holes. Showed practically no wear after machining three complete castings. This was Kennametal's new and improved tungsten carbide Grade K6.
Other makes were unable to take shock of interruptions, or withstand the highly abrasive cutting—could not complete one casting.
on Tough, Aluminum Bronze
Rough turned scaly Ampco metal bar stock—6" diameter x 14" long—continuously for 8 days. After turning 224 pieces (equivalent to 85 miles of lineal cutting) Kennametal tool did not need regrinding.
With other tools only one-fourth as many pieces could be machined before resharpening was needed.
on Chrome Nickel Steel
Rough turned very scaly chrome nickel forging —2' diameter x 10' long—in 30% less time, and with triple the tool life obtained from other tools, which could not stand up under the plunge cut through scale.
on Monel Metal
Bored 4⅛" hole in 6' long solid monel metal forging, to accurate size, in 32 minutes. HSS tool required 10 hours; sometimes produced up to .040" taper, due to wear, which required reboring.
on 14% Manganese Steel
Successfully rough and finish bored and turned huge casting. (High manganese steel is usually ground rather than machined because it hardens under cutting tool pressure.)
on "Everyday" Jobs, Too
The tool that takes tough jobs in stride is the one to use on routine production runs where overall cost-per-piece is the important factor. This is conclusively proved by official reports covering consumption of cemented carbides used during the war for machining 105mm shells:
• Where cemented carbide tools other than Kennametal were used, average carbide consumption per shell produced was approximately 3 calculated grams.
• In typical plants using Kennametal exclusively, average consumption per shell was only ⅓ gram.
In other words—Kennametal Tools were up to 6 times as serviceable—a fact of utmost significance to all who must now manufacture post-war products—economically.
KENNAMETAL
KENNAMETAL Inc. LATROBE, PA.

Chemist Warns of Raw Materials Depletion; Submits National Plan

• • • Though the United States has depleted its lush mineral resources, it still has immense reserves of low-grade and submarginal ores which are practically untouched, William H. Waggaman, chemical engineer of Alexandria, Pa., said in a survey reported to the American Chemical Society.

"If this country is to maintain its leadership among the world's great nations, and be self-sufficient in time of emergency, we must adjust our technology to the domestic raw materials available," declared Mr. Waggaman in *Chemical and Engineering News*, journal of the society, outlining a national mineral policy for protection, peace and prosperity.

"This means that from now on we should devote our energies to the utilization of large but lean ore deposits mined and treated by improved methods that will offset the cost of handling greater tonnages of raw materials, reduce waste, and recover wherever possible useful and salable byproducts. In other words, as our better grade raw materials are depleted we must make better use of our brains."

Paradoxical as it may appear, Mr. Waggaman points out, the possession of high-grade ore deposits, unless they are almost unlimited, may prove a doubtful blessing and actually jeopardize a nation's future development.

"Such ores bring about the use of processes and the installation of enormous and costly plants suitable only for special types of raw materials.

"When the domestic reserves of these better ores are depleted, industry turns to foreign sources of supply in order not to revamp its established processes and existing equipment.

"Thus we have a serious lag in work leading to the economic utilization of our less concentrated raw materials and the nation is caught unprepared when conditions force it to fall back on its own resources."

Mr. Waggaman stressed the necessity of continuing the fundamental research forced upon the nation by the war but essential to future peace and prosperity.

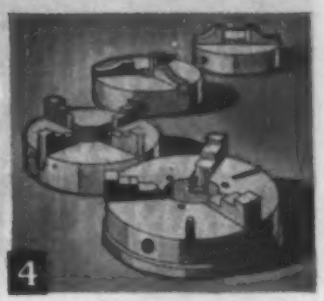
"When peace is firmly established there may be one of the most gigant

First youve gotta know what a chuck is

Chucks hold tools or work that are in motion.

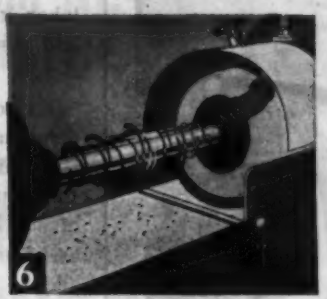
Chucks owe their origin to the ancient potter's wheel.

First chucks were used for making cannon in War of 1812.



There are many kinds of chucks. Here are some in common use.

Many chucks are too "slow" for modern high-speed production.

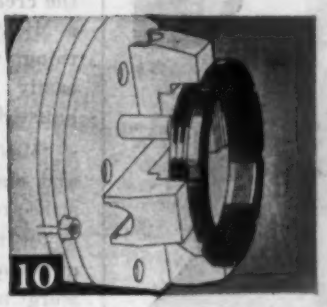


Other chucks aren't positively true —lack hair-splitting accuracy.

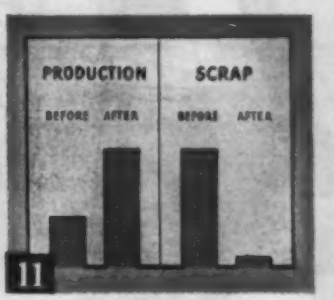
New and better is the amazing Woodworth Diaphragm Chuck.

Jaws fasten to diaphragm which flexes like bottom of oil can.

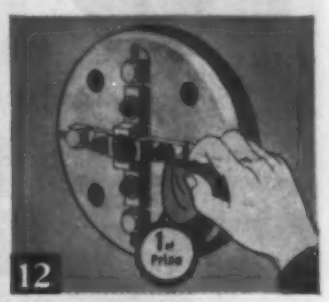
Thin-walled parts won't distort in machining to close accuracy.



Large, heavy parts can be processed with fine precision.



Steps up production 2¼ times—scrap practically eliminated!



A winner! Industry acclaims Woodworth Diaphragm Chuck!

What Woodworth Products Mean to Industry

THE DIAPHRAGM chuck is a typical Woodworth contribution to mass production efficiency. Here's why.

Every Woodworth product must conform to the basic policy of this company—*TO MAKE ONLY PRODUCTS WHICH WILL BENEFIT INDUSTRY THROUGH INCREASED PRODUCTION AND REDUCED COSTS.*

This means that the great demand for Woodworth Tools and Gages will be continuing, especially in view of the coming battle for postwar markets.

And it means that Woodworth engineers have been charged with the responsibility of searching constantly for new ways to speed up and lower the cost of production, in connection with Woodworth Products of the future.

The constant growth and expansion of the N. A. Woodworth Company is due to strict adherence to these objectives.

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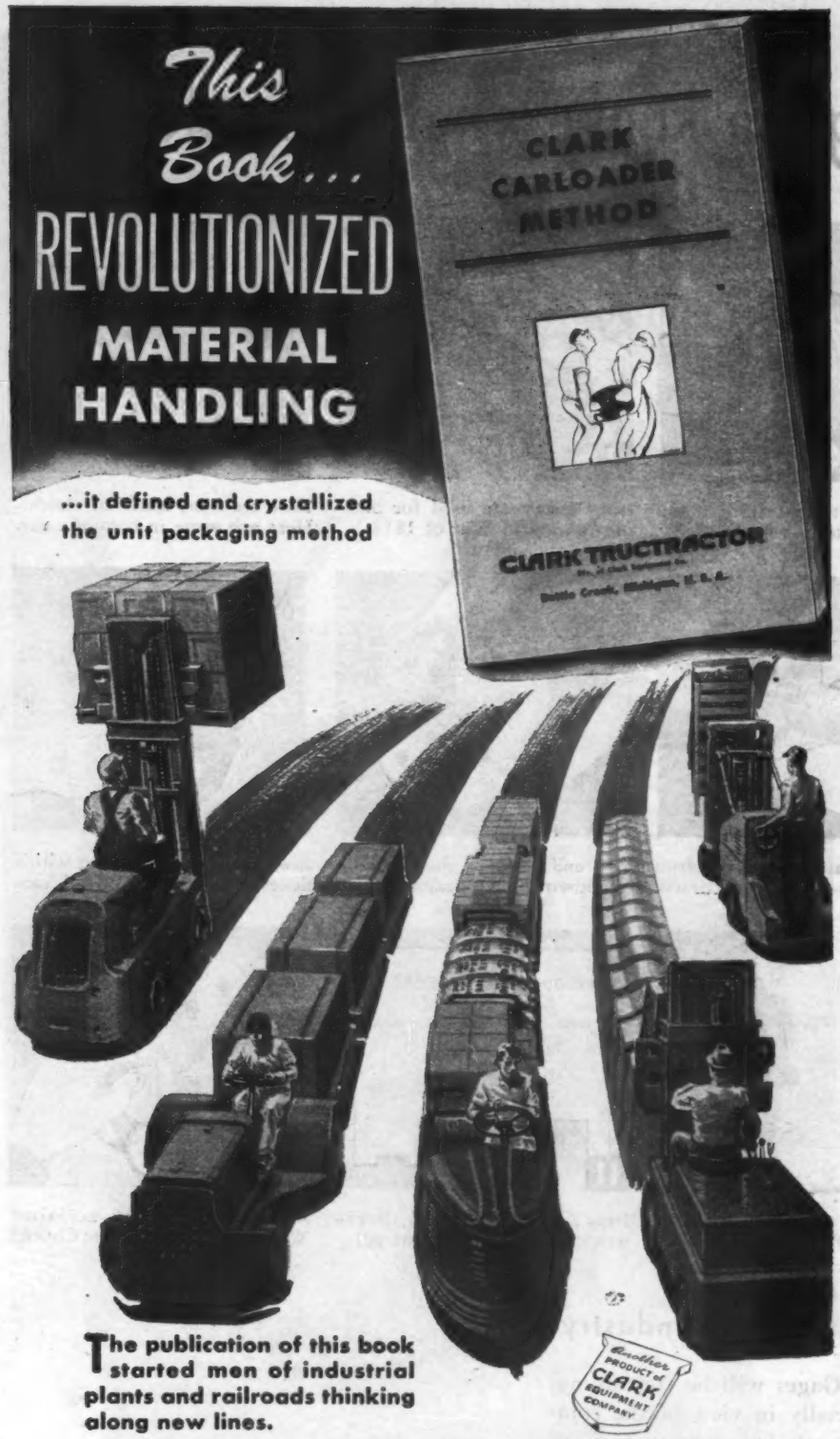

The publication of this book started men of industrial plants and railroads thinking along new lines.

Out of this book stemmed the material handling principles and methods that have enabled the Army and Navy to successfully handle in this war the burden of supplies, munitions and equipment.

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business booms of all time, and it will be a great temptation under such conditions to abandon fundamental research in order to devote our energies to the world's immediate needs.

"But eventually these needs will be satisfied and the production facilities of other nations restored. Business then will depend more and more on the demands of our own citizens for our own goods.

"It will be poor economy indeed to curtail investigations now under way that will enable us to make full use of American raw materials for the manufacture of American products, assuring additional jobs for American labor, greater overall national wealth, and insurance against future aggression."

Exploration work by the government has shown that very few essential minerals are lacking entirely in this country, though the end of many of our highest grade and easily processed ores is in sight, Mr. Waggaman adds.

"For many years American industry has gone blithely along, mining the cream of its mineral deposits with a Micawber-like optimism that something would 'turn up' when these easily convertible assets were exhausted.

"Most of our industrial processes and manufacturing plants were, and still are, based on the use of high-grade raw materials, and when adequate quantities of certain rich ores were not immediately at hand, we imported them from countries where low-cost labor enabled us to obtain them cheaply. This was complacently considered smart business practice.

"Nature endowed the United States with exceptional mineral wealth, but with the profligacy of youth we have been rather wasteful of our heritage.

"This does not mean that there is any immediate danger of our becoming a 'have not' nation or that we shall soon lack the essentials for an abundant life, but it does mean that our known reserves of the lush or more easily worked ores have been greatly depleted, and the time has come when we must not only be more cautious with those that remain but must also exercise greater ingenuity and skill in extracting metals and other mineral products from ores that our forebears considered uneconomical, if not impossible to exploit."

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(SULFITE-TREATED)
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MACHINABLE is the word for this steel—and VERSATILE is another. You can make everything from crankshafts to wrench sockets from Wisconsin's Sulfite-Treated Steel. And best of all, it eliminates machining problems. It's tops in machinability with no loss in strength or hardness.
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MILFORD PROFILE SAW is the product of a group of specialists who make nothing but metal cutting saw blades. It is made with painstaking care and the most modern equipment to do the best all-around cutting job that can be done . . . on any and all machines.

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Now packed in an improved stronger box, from which the saw can be stripped free . . . no binding . . . no buckling.

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Says Wartime Demands Have Depleted U. S. Supply of Minerals

Washington

• • • Although the United States is far from being a "have not" nation from the standpoint of minerals resources, wartime demands have depleted domestic supplies to the extent that careful conservation must be practiced in the future, according to the Dept. of the Interior.

Declaring that "we have been depleting the cream of our minerals resources at a terrific rate," the report calls for continued search for additional deposits, increased utilization of low-grade resources, additional technological research and reduction of waste in production and utilization of existing supplies.

In the 5-yr period ending Jan. 1, 1945, the United States mined 469,235,000 long tons of domestic iron ore —the greatest quantity ever produced in a like period, according to department estimates.

Based on postwar use at the 1935-1939 level, the United States has sufficient iron ore to last 111 yrs, the report says.

Bitminous coal production in the same five-year period amounted to 2,767,791,000 short tons; anthracite, 2,278,000 short tons; zinc, 3,642,000 short tons; lead, 2,278,000 short tons; copper, 5,000,000 short tons; bauxite, 14,619,000 short tons; mercury, 223,000 flasks; molybdenum, 223,519,000 lb; tungsten, 20,750 short tons; fluorspar, 1,715,000 short tons.

War demands for some minerals have barely touched the available supply, the report adds. Magnesium, it is pointed out, is still available in almost limitless quantities. Approximately 99 pct of the commercial reserves of bituminous coal and lignite are still available but the anthracite situation is somewhat different, with about 65 pct of the original supply remaining. About 90 pct of molybdenum still remains.

More than two-thirds of the commercial iron ore reserves remain to be mined, although some of the richest mining areas are being depleted. In 1944, the United States had nearly 60 pct of domestic fluorspar and sulphur reserves left intact, the report says.

Only about 40 pct of domestic copper is still unmined, less than 35 pct of zinc, tungsten, manganese, bauxite and vanadium. A little more than 25

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Available in rubber or resinoid—a full range of styles and sizes. 3 bond types—for every operation.

WANT TO TRY ONE? Tell us what you have to cut, grinder you use and size wheel you'd like. We'll send a test wheel promptly. *Write for Circular.*

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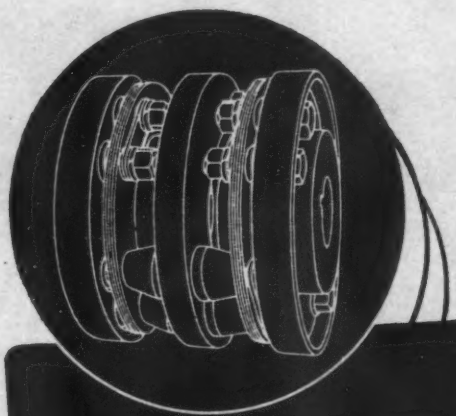

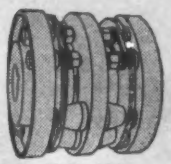

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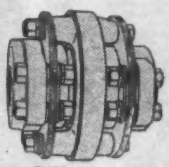

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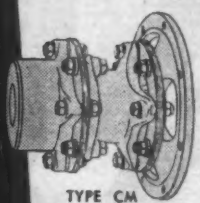

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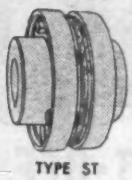

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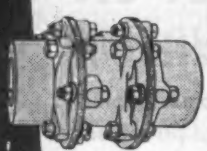

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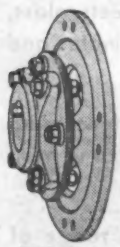

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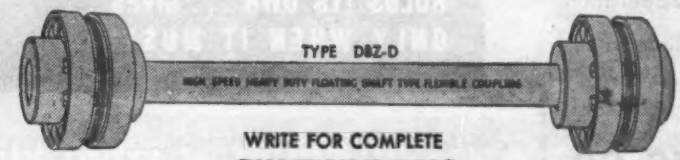

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pct of the original commercial reserves of chromium and less than 20 pct of lead and silver remain, the report says.

Once the chief sources of mercury supplies, less than 5 pct of the domestic supply remains unmined.

Department of Interior forecasts based on average annual use for the period 1935-1939 gives us sufficient magnesium and salt to last indefinitely, enough bituminous coal and lignite to last 4300 yr, phosphate rock to last 805 yr, molybdenum to last 422 yr, and sufficient anthracite coal to carry us through the Winter of the year 2140.

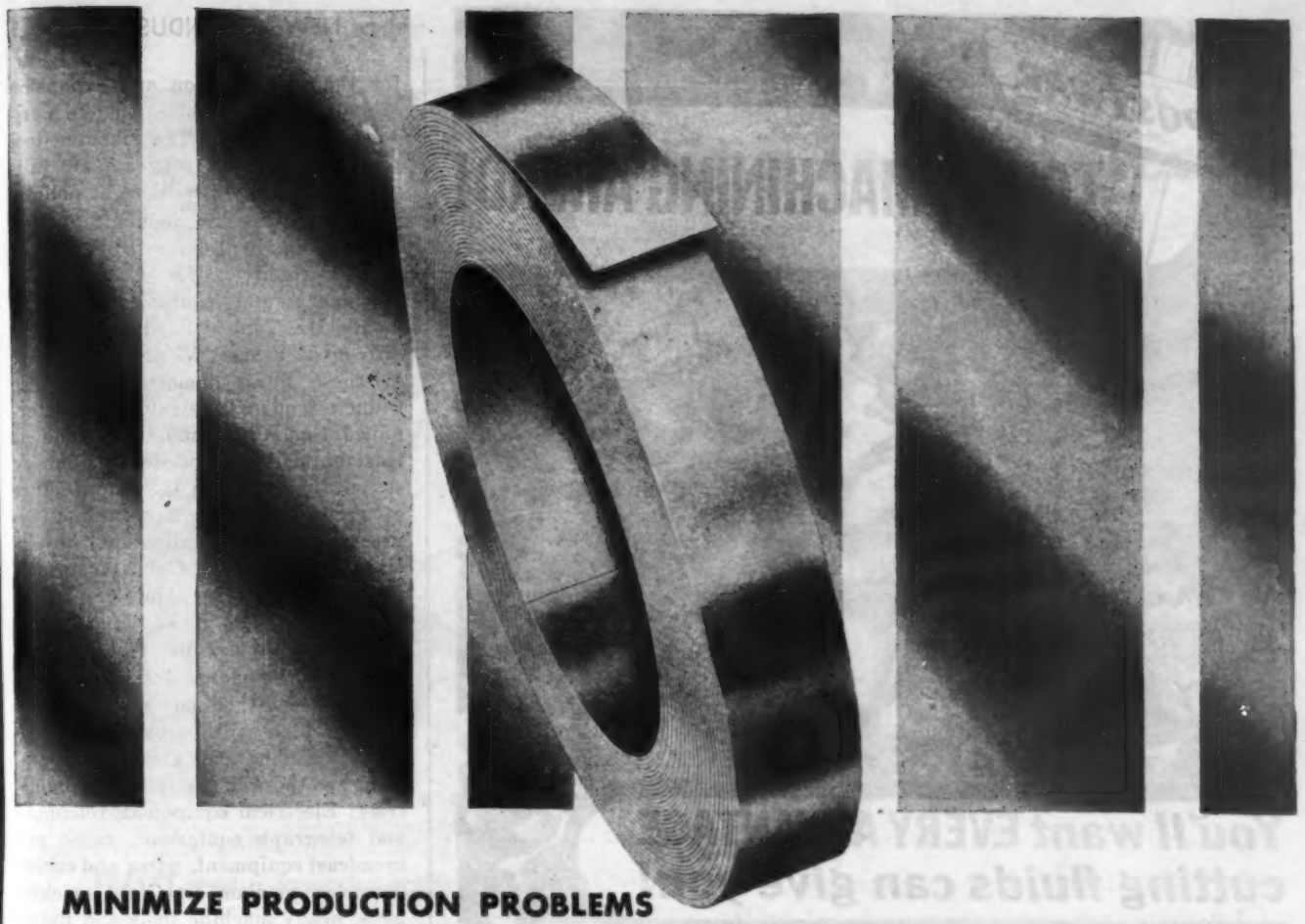
Emphasizing that these appraisals do not necessarily indicate that prewar rates of production can be maintained for the periods indicated, the report estimates commercial reserves of sulphur will last 55 yr, fluorspar 40 yr, copper 34 yr, zinc 19 yr, cadmium 16 yr, lead 12 yr, silver 11 yr, bauxite 9 yr, vanadium 7 yr, antimony 4 yr, tungsten 4 yr, manganese 2 yr, mercury 3 yr, and chromite 1 yr. These estimates are based on production at the 1935-1939 level.

China-America Group Forms Machine Tool Advisory Committee

New York

• • • **Formation of an advisory committee of machine tool manufacturers to explore ways whereby the American machine tool industry can participate to the maximum extent in the industrialization of China, was initiated at a conference in New York on Sept. 26 of representatives of a score of outstanding machine tool companies, called by the China-America Council of Commerce and Industry. After an extended discussion, led by Ralph E. Flanders, president of Jones & Lamson Machine Co., it was agreed that the China-America Council, of which Mr. Flanders is a director, should set up an advisory committee of machine tool executives to confer with the official Chinese planning and purchasing agencies here.**

Preceding the discussion, China's machine tool needs for her initial reconstruction program were outlined by Alex Taub, consulting engineer for the reorganized Chinese Supply Commission in America. This program calls for the purchase in this country during the next three years of approximately $2,000,000,000 worth of machinery, equipment and materials



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Good cutting fluids, properly applied, are always an important factor in achieving the greatest efficiency in metal working. When you can reduce machine down-time, improve work finish and save tools, your competitive odds are better.

D. A. Stuart Oil Company have been making and applying cutting fluids since 1865—gathering experience that is long, broad and successful—experience that you may use to advantage. Invite a Stuart Oil Engineer into your plant and through him the Stuart Organization will work with you in setting up cutting fluid standards for the top metal-working efficiency you will need for the times to come. No obligation, of course.

The 60-page Stuart booklet, "Cutting Fluids for Better Machining", contains interesting facts about cutting fluids and their application. *Write D.A. Stuart Oil Company, Limited, 2737 So. Troy Street, Chicago 23, Illinois.*

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for the rehabilitation and expansion of industry, transportation and agriculture in China. The machine tool purchases for this program are estimated at scores of millions of dollars.

Although for an indefinite period ahead China will have to depend on foreign countries for most of her machinery and equipment requirements, Mr. Taub pointed out, she will also make a start in producing part of these needs domestically. "The Chinese leaders," he said, "are determined that China must be made at least partially independent of outside sources of supply in the manufacture of certain basic equipment." This process of industrialization, he declared, would make China a steadily growing market for American industry and provide great opportunities for American machine tool builders.

Among the plants included in the initial reconstruction program for China which will require much imported machine tools and allied equipment are those in the following industries: Electrical equipment, telephone and telegraph equipment, radio and broadcast equipment, wires and cables, batteries, medium and light machine tools, heavy machine tools and industrial equipment, hand tools, automotive equipment, diesel and steam engines, compressors, turbines, pumps, boilers, textile machinery, small agricultural implements, well drilling equipment, locomotives and railroad cars. Approximately 25 enterprises are planned for these industries, with imported machinery and construction materials required for them estimated at more than $150,000,000 during a period of three years. In almost every case, it is pointed out, the products to be turned out by these plants will make up only a small part of China's requirements.

"It would be highly advantageous for the American machine tool industry," Mr. Taub said, "to cooperate in an organized way with Chinese technicians and executives now in America. An advisory group representing the industry would be able to help the Chinese determine the most suitable types of equipment for the given purposes and to cooperate in training Chinese mechanics and technicians and in insuring the most effective use of American equipment in China. This in turn will create increased goodwill and help to insure a large, continuing market in China for American machine tools."

Mr. Flanders emphasized the preference of the Chinese for American equipment and technical skill. He

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Type 416 Hexagons	1/4" to 2"
Type 302 Square	1/4" to 2"
Type 303 Square	1/8" to 3/16"
Type 302 Flats	1/8" x 3/8" to 1" x 4"

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Type 304 } 24" x 96" to 48" x 120"

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Type 302 . . . . . .010" to .062"
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Also in spring temper

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Type 304 . . 1/8" to 3/16" x 1" to 2" (equal leg)

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Type 304 Seamless	1/8" to 5" OD x 20 ga. to 1/4" wall
Type 304 Welded	3/8" to 1½" OD x 18 ga. to 16 ga. wall
Type 347 Welded	3/8" to 3½" OD x 20 ga. to 16 ga. wall

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Type 304 Seamless	1/8" SPS to 6" SPS 1/8" EHPS to 4" EHPS
Type 304 Welded	1/8" SPS to 2" SPS
Type 316 Seamless	1/2" SPS to 2" SPS
Type 316 Welded	1/2" SPS to 2" SPS
Type 347 Seamless	1/2" SPS to 3" SPS
Type 347 Welded	1/2" SPS to 2" SPS

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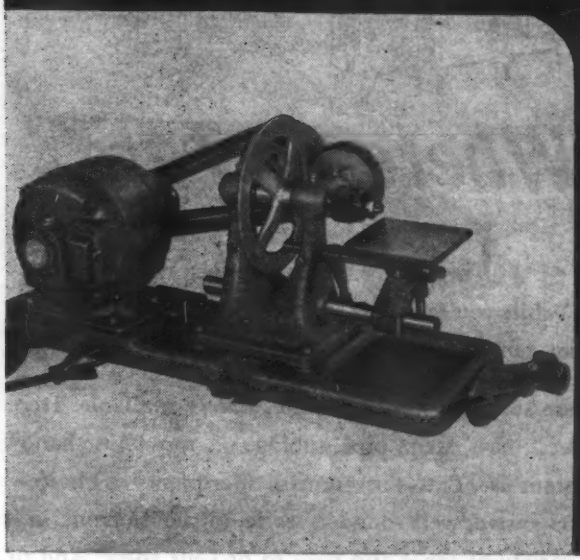

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etc.

• Built in 3/16" and 5/16" sizes complete with motor, integral toggle switch and cord. Other models for belt drive in bench and pedestal mountings

RICKERT-SHAFER pioneered the planetary friction drive tapping machine. Thousands are in war service today. The popular bench style motor driven unit illustrated above provides a speedy inexpensive method for gauging threads on shell work—for tapping—for reaming—for buffing, etc. Press to tap—pull to reverse and the reverse is lightning fast. This feature protects the tap and speeds the routine operation. These are built in 3/16" and 5/16" sizes. Describe your requirements.

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pointed out, however, that the American machine tool industry would be in a position to render effective assistance to China only when the Chinese had definitely determined on the products and designs to be manufactured.

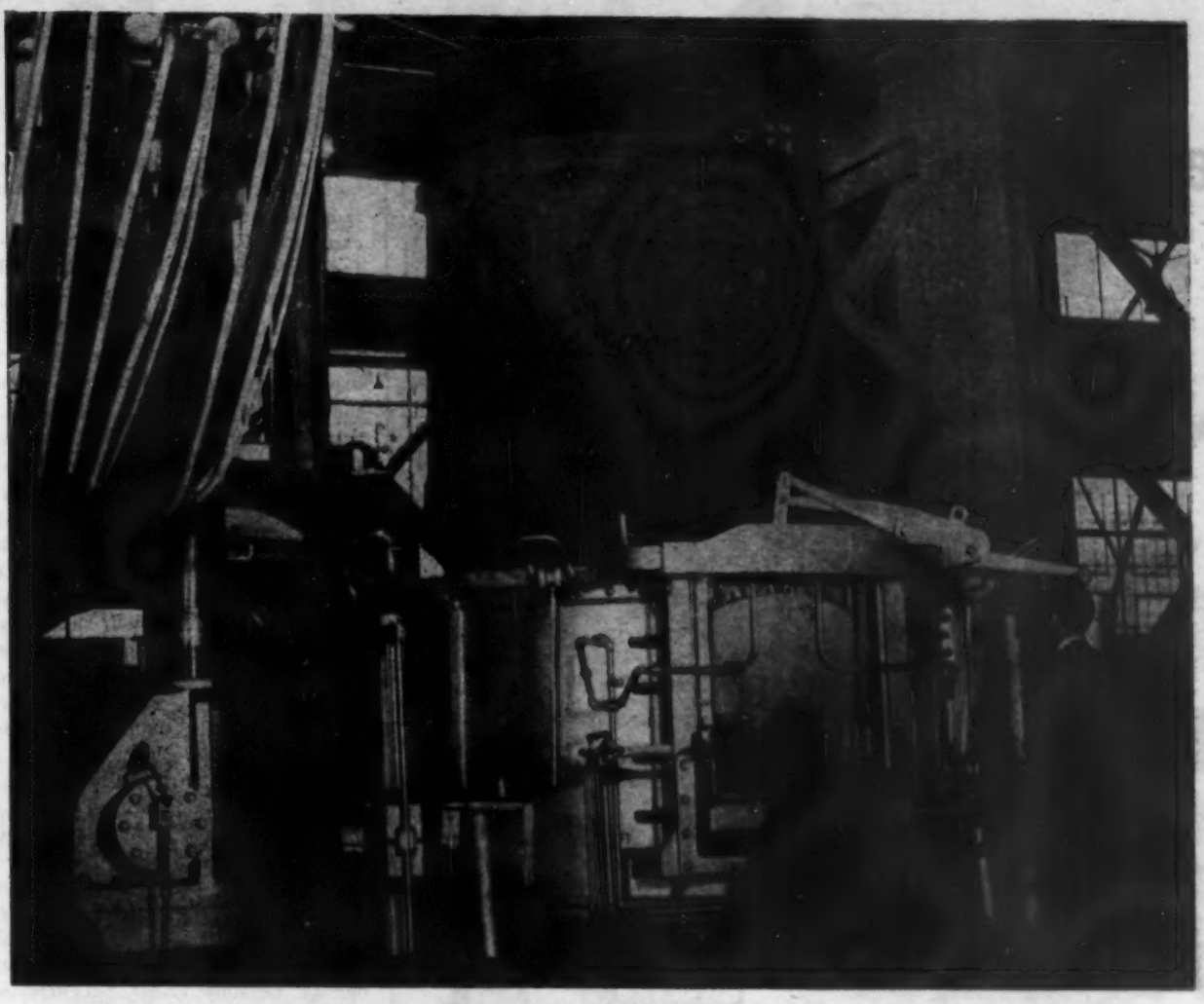
The machine tool advisory committee of the China-America Council, under the leadership of Mr. Flanders, is expected to have a preliminary conference with the Chinese authorities in the near future. Representatives of the machinery firms attending the China-America Council conference included the following: M. R. Sacra, the Black & Decker Mfg. Co.; Joseph R. Keller, the Black Rock Mfg. Co.; R. J. Ahern, Billings & Spencer Co.; Val C. Hart, the Bullard Co.; Nelson F. Caldwell, Cincinnati Milling Machine Co.; Henry Chaplin and Jaques A. Gerard, Cone Automatic Machine Co., Inc.; Albert Meyers, Consolidated Machine Tool Corp.; H. C. Alpaugh and W. E. Huntley, DoAll International Co.; Stewart Elliott, Ex-Cell-O Corp.; Cecil M. Peter, the Fellows Gear Shaper Co.; Glenn Spohn and A. C. Wais, General Machinery Corp.; J. C. Hebert, Roy Jacobs & J. R. Knight, Jones & Lamson Machine Co.; L. H. Roemer, the R. K. LeBlond Machine Tool Co.; Charles Gross, Murchey Machine & Tool Co.; F. W. Altorfer, the National Acme Co.; Ralph How, New Britain Machine Co.; Charles F. Myers, Republic Drill & Tool Co.; T. B. Buell, Sundstrand Machine Tool Co.; Noble Clark, the Warner & Swasey Co.

Procedure for Release From Armed Services Outlined in Bulletin

Chicago

• • • Procedures for the release of officers and enlisted men from the armed services for return to specific jobs in industry vital to reconversion are outlined in a bulletin prepared by the reconversion problems service of the Chicago Assn. of Commerce.

The Assn. of Commerce emphasizes that most employees will be released under the point system already established and that a request for release must be made by the individual, not by the employer. The employer plays a vital part in the procedure, however. Release of key employees from the Army to employment essential to national health, safety or interest, is more likely than from the Navy,



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SIZE • NT •

Lectromelt NT Top Charge Furnace is constructed to pour heats of 15 to 20 tons, normal rating, in general steel mill production. The top charge feature offers many advantages such as greater output due to decreased charging time, lower power and refractory costs, increased capacity per man hour, etc. Especially large scrap can be charged readily, and fluffy scrap can be charged to shell rim with a drop bottom bucket.

Lectromelt, Size N, is identical with Size NT with exception that it is door charge instead of top charge.

Lectromelt Furnaces of the top charge type are available in sizes ranging from 100 tons down to 250 pounds. Write for catalog. Ask for any desired assistance.

LECTROMELT NT SPECIFICATIONS

(a) Usual acid steel hourly rating..... 10 tons

(b) Usual size of heat.....15 to 20 tons

(c) Has poured in one heat.....40 tons

(d) Usual KVA rating.....6000 to 7500

(e) Shipping weight—furnace with electrical substation and control equipment (approximate).....NT 120 tons
N 105 tons

(f) Shipping weight —2 linings and 50 electrodes (approximate).....100 tons

(g) Volume data (e) 5000 cu. ft.
(f) 2500 cu. ft.

PITTSBURGH LECTROMELT FURNACE CORPORATION

PITTSBURGH 10, PENNA.

Perhaps PECO can help you get your product to market faster!

We make metal parts and assemblies in quantity... also engineer, design and develop.

THE experience, equipment and co-operation that produced 9,000,000 precision bomb fuzes in thirty months and won us five citations for excellence in war production are now available to help you on problems of metal parts manufacturing, assembly work, or engineering and development.

For twenty-seven years we've designed and manufactured parts and equipment in the automotive, aviation, industrial and consumer fields. Our facilities include large automatic screw machines and chuckers for volume production to close tolerances.

Do we fit into your picture? Why not tell us your problem?

PECO MANUFACTURING CORPORATION

Subsidiary of Bendix Aviation Corporation

INDIANA AVENUE AND HOPE STREET

PHILADELPHIA 33, PENNA.

Coast Guard and Marine Corps, the bulletin points out.

To make a person eligible for release, it must be definitely determined from documentary evidence that he can render more valuable service to the nation in a civilian capacity than in the service.

The individual should include in his request for release the name of the firm or agency, or the description of the activity to which he plans to return, and the product manufactured (if applicable). Employers may wish to furnish pictures or descriptions of their products already prepared for advertising or selling purposes, it is suggested. Also to be included are the title and complete description of the position to be filled, the individual's connection with the activity prior to service and his qualifications for the position. Letters from the employer should substantiate these facts with such information as a reaffirmation of the company's intention to re-employ the individual in his former position or in another of importance, a description of the relationship of his position to the operation of the organization as a whole and a description of the responsibilities of the position in terms of number of persons under his direction, dollar value of plant and equipment under his supervision, importance of his work in terms of the company's development, and the value or national importance of the product with which he will be concerned. Mention should be made by the company of the effect, if any, his employment will have on the future operation of the company, and upon the employment of additional persons in the next six months to a year.

An Army officer files his request for release with his commanding officer, and it is then forwarded through proper channels to the Adjutant General (War Dept. circular 485). An Army enlisted man files his request with his commanding officer, and it is then forwarded to Washington (Army regulation 615-363). Navy officers and enlisted men file their requests for release directly with commanding officers. They are then forwarded through proper channels to Chief of Naval Personnel in Washington. Coast Guard and Marine Corps requests are filed in the same manner, being forwarded through proper channels to the Coast Guard in Washington or to the Commandant of the Marine Corps there.

IN PEACE AS WELL AS WAR

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—the COMPLETE line of brushes that has proved its worth in industry and in painter use over the past four years.

Available in flat and oval varnish, metal bound flat paint, stuccos, wall coating and calcimine types. For sale from Coast to Coast.

PITTSBURGH
PLATE GLASS COMPANY
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4 YEARS ACTUAL USE

Send for the scientific facts in the booklet "The Fascinating Story of NEOCETA".

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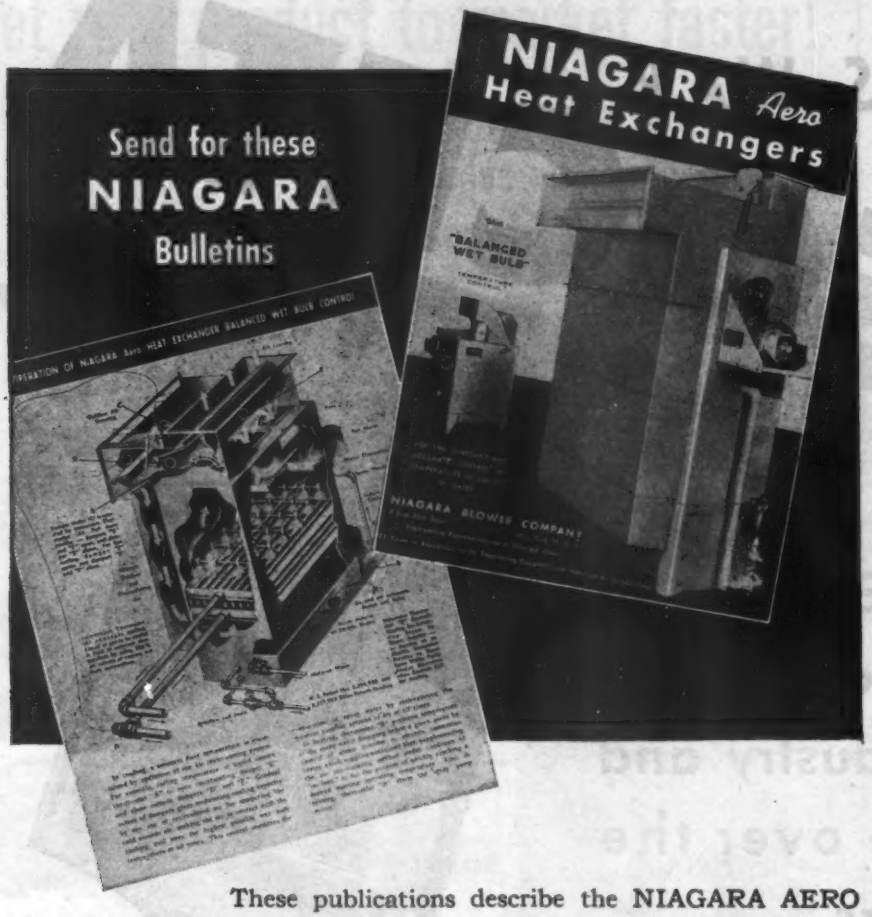

These publications describe the NIAGARA AERO HEAT EXCHANGER and some of its applications. It accurately regulates the temperature of gases and liquids. Industrial plants using chemical and heat-treating processes have gained extra benefits from using this equipment wherever cooling water is used or any fluid is cooled to exact temperatures.

Some of the applications are: controlling temperature of liquid chemicals and intermediates in process; controlling jacket water temperature in power and process equipment; regulating the temperature of controlled atmosphere; controlling liquid bath temperatures.

As a cooler, the NIAGARA AERO HEAT EXCHANGER saves the cost of 95% of the water circulated.

Niagara Bulletins 90, 94 and 96 give detailed information. Write for them today.

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INDUSTRIAL COOLING HEATING • DRYING

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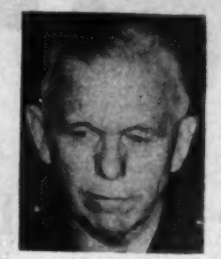
HUMIDIFYING • AIR ENGINEERING EQUIPMENT

Marshall Reports German Munitions Better Than Ours

Washington

• • • In a report completely realistic and factual, General Marshall, Army Chief of Staff compares the quality of Allied and enemy weapons and military establishments. He said, "the nation's state of unpreparedness along with that of the British Empire gave the Axis nations an overwhelming initial advantage in materiel. The Japanese campaigns in China, the Italian campaign in Ethiopia, and the participation of German and Italian troops in the Spanish Civil War afforded these enemies an opportunity to test their new weapons on the battlefield. This is a matter of very great importance, preliminary to decisions for quantity production of any weapon. Since we had some time in which to mobilize our resources, the vastly superior industrial establishment of the United States eventually overcame the initial advantage of the enemy.



General Marshall

"During the past two years the Army was well armed and well equipped. The fact is we dared to mount operations all over the world with a strategic inferiority in numbers of troops. Were it not for superiority in the air and on the sea, in mobility and in firepower we could not have achieved tactical superiority at the points chosen for attack nor have prevented the enemy from bringing greater forces to bear against us."

Comparing the quality of U. S. and German weapons, he states, "overshadowing all other technological advance of the war was the Allied development of the atomic explosive. The tremendous military advantage of this terrifying weapon fell to us through a combination of good luck, good management and prodigious effort. The harnessing of atomic power should give Americans confidence in their destiny but at the same time we must be extremely careful not to fall victim to overconfidence. This tremendous discovery will not be ours exclusively indefinitely. In the years

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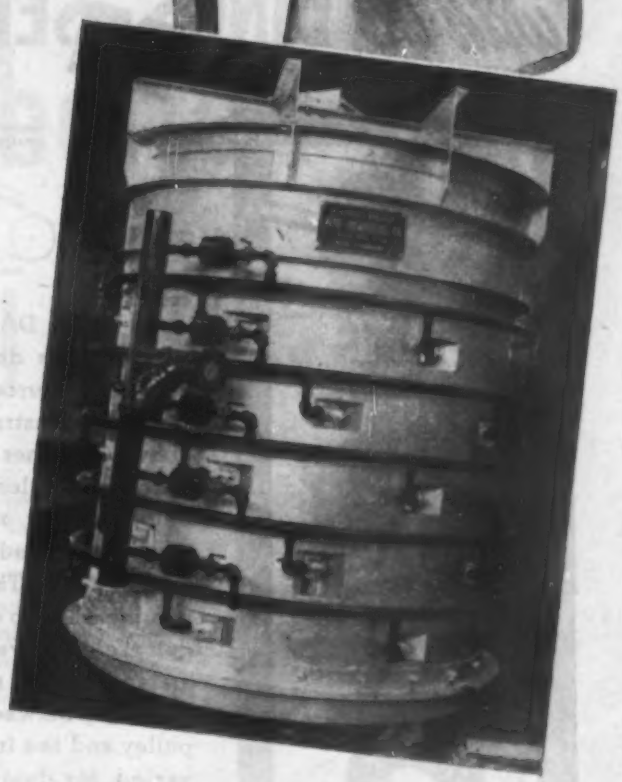
LABORATORY EXPERTS GO INTO ACTION



Here's how Salem Service includes laboratory experts who collaborate with our heating engineers in developing new heating ideas to meet your peace production. Many heating innovations have been originated during the war. Salem can incorporate these cost-cutting ideas into your new heating furnaces and allied equipment.

When you "Call Salem," a Salem engineer discusses production needs with you. He returns to Salem and puts visual experts to work. Next, useful production information on costs plus "roughs" are submitted. After you have given us the o. k., working blueprints are prepared. Construction gets under way and in a reasonable time you have the most efficient heating equipment you can buy.

CALL SALEM about your heating furnace or allied heating equipment. Salem originated "Engineered Heat" and built the world's largest rotary forge furnace.

NOTE: Write for Salem's new 20-page, illustrated booklet—"Engineered Heat," complete with easy-to-use heating and temperature charts.

New ideas, tempered with thorough planning, seasoned with experienced workmanship, give you the type of heating furnace and equipment you want for low-cost, profitable operation. CALL SALEM for any type, size, or style of heating furnace or allied heating equipment.

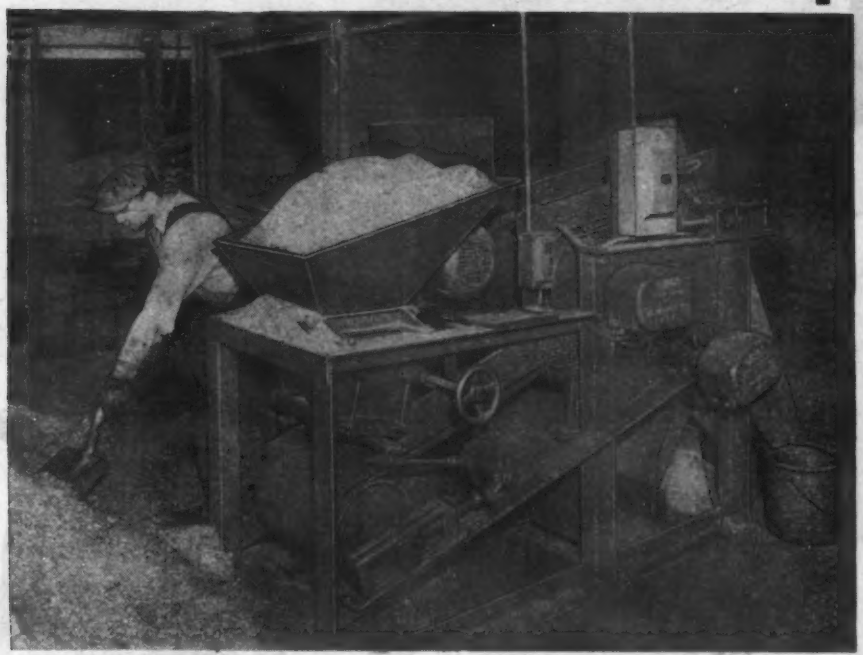
SALEM

ENGINEERING COMPANY

SALEM, OHIO

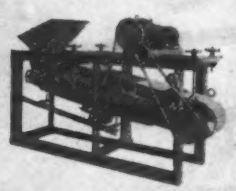
Engineered Heat

Two-way separation of metal scrap



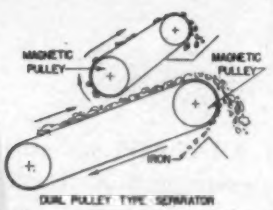
with the DINGS DA SEPARATOR

Operating principle of the Dings DA Separator. Dings Magnetic Pulleys are used as head pulleys in a belt conveyor system. Bronze spacer rings. air-cooled design.



Dings BN Separators combine magnets of alternate polarity with mechanical agitation to jolt loose tangled metal scrap.

Alnico horseshoe magnet used with finely divided magnetic sprinklings to inspect castings for flaws. 2½" wide x 3" high. Pole bases ¾" x ¾".



DUAL PULLEY TYPE SEPARATOR

The Dings DA Dual Pulley Type Separator is doubly effective for separating ferrous from non-ferrous scrap. As illustrated in the diagram above, the upper magnetic pulley lifts ferrous particles from the inclined belt and any remaining magnetic scrap is removed as it passes over the second pulley. Thus, ferrous particles in either the top or bottom of the burden are effectively reached and separated from the non-ferrous scrap.

The gap between the first magnetic pulley and the inclined belt may be varied for desired results with a vertically-adjustable idler roll under the belt.

Write for a complete description of the DA Pulley and other Dings High Intensity Separators.

DINGS MAGNETIC SEPARATOR CO.

516 E. SMITH STREET MILWAUKEE 7, WISCONSIN

World's Largest Exclusive Builder of Magnetic Equipment
Established 1899

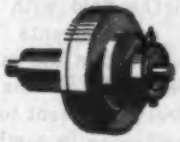
Dings MAGNETIC SEPARATION HIGH INTENSITY

of peace between the two world wars we permitted Germany to far outpace us in the development of instruments which might have military use. As a consequence German development of long-range rockets and pilotless aircraft, stemming from years of peacetime research, was far more advanced than our own, which began in earnest only after the war had already started.

"In the development of aircraft and ships United States factories and productive "know-how" soon gave the Allies both a qualitative and quantitative advantage over Germany and Japan. By the time the great air battles of Europe and the far Pacific were joined, U. S. planes were superior in numbers and types to the enemy's. Our development of the long-range heavy bomber, now exemplified by the B-29, has been unmatched. The Germans themselves admit they did not even foresee our developments in the long-range fighter. They first introduced the jet engine in combat, but this was not because we had made no progress in this field. By the time their jet fighters were ready to take the air, the only areas in which they could give them operational tests were swept by our fighters. They had either to test them in combat or not at all. The German jet fighters were limited to a maximum endurance of a little over an hour. Ours already had the endurance to fly nonstop from San Francisco to New York.

"Another noteworthy example of German superiority was in the heavy tank. From the summer of 1943 to the spring of 1945 the German Tiger and Panther tanks outmatched our Sherman tanks in direct combat. This stemmed largely from different concepts of armored warfare held by us and the Germans, and the radical difference in our approach to the battlefield. Our tanks had to be shipped thousands of miles overseas and landed on hostile shores amphibiously. They had to be able to cross innumerable rivers on temporary bridges, since when we attacked we sought to destroy the permanent bridges behind the enemy lines from the air. Those that our planes missed were destroyed by the enemy when he retreated. Therefore our tanks could not well be of the heavy type. We designed our armor as a weapon of exploitation. In other words, we desired to use our tanks in long-range thrusts deep into the enemy's rear where they could chew up the supply installations and communications. This required great

There are 257 Dodge factory graduate Transmissioneers, located in principal cities, to show you new and better ways of transmitting power.



Sign of the Dodge Transmissioneer

Whenever you have a problem in power application, call a Transmissioneer—your local Dodge distributor. He has the latest answer. His knowledge and specialized experience are backed by a broad line of mechanical power transmission equipment—bearings, sheaves, pulleys, clutches and other drive components. Usually your immediate needs can be supplied from local stock.

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TRANSMISSIONEERED MEANS ADVANCED DESIGN IN POWER DRIVES

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Dodge Mfg. Corporation

endurance—low consumption of gasoline and ability to move great distances without breakdown.

"But while that was the most profitable use of the tank, it became unavoidable in stagnant prepared-line fighting to escape tank-to-tank battles. In this combat, our medium tank was at a disadvantage, when forced into a head-on engagement with the German heavies. Early in 1944 it was decided that a heavy American tank, on which our ordnance experts had been continuously experimenting since the war, must be put into mass production. As a result the M-26 (Pershing) tank began to reach the battle lines last winter. This tank was equal in direct combat to any the Germans had and still enjoyed a great advantage in lighter weight (43 tons), speed, and endurance. At the same time work was begun on two new models, the T-29 and T-30, which weighed 64 tons, one mounting a high-velocity 105-mm rifle, the other a 155-mm rifle.

"Following the fierce fighting in North Africa and in the Papuan campaign in New Guinea, it became clear that our lack of preparedness and research in military instruments during peacetime would have to be overcome by extreme measures. Accordingly, in the late spring of 1943 I selected an expert ordnance officer, Col. William A. Borden, and directed him to work under me independently of normal War Department channels in the development and modification of weapons and improved techniques. His first efforts were devoted to increasing the effectiveness of our weapons against the Japanese in jungle fighting. As a result, the 105-mm and 155-mm mortars, flame throwers, ground rockets, improved launching devices, skid pans for towing heavy artillery in mud, improved bazooka ammuition, and colored smoke grenades were developed and the production and shipment to the theatres were expedited.

"The New Developments Division was established to be charged with coordinating the experience of our troops in the field with the Nation's scientific developments in order to keep us abreast in the race for newer and more deadly means for waging war. Officers were sent to the theatres to observe troops in combat to search for ways in which to apply our civilian scientific knowledge to the problems of the battlefield. When some item was developed it was taken to the theatres for trial and if successful put into production. Some examples: flame-throwing tanks, air rockets, im-

L-302

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Glad the war is over, and our part finished. . . . Glad we are now permitted to resume manufacturing our complete lines of high quality Welded and Weldless chains for all purposes. For our civilian customers. . . . Fortunately, our only reconversion problem is to reconvert back orders into shipping orders.

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Companions to Colonial's line of standard Broaching Presses and Straightening Presses, these ultra-modern all-hydraulic units are characterized by exceptionally smooth yet powerful action, due to use of the exclusive Colonial hydraulic pressure system, with direct acting cylinder built into the machine head, etc.

Capacities: 15, 20, 35, and 50 tons.

Stroke: Adjustable, 12 in. maximum.

Speed: Adjustable, 60 to 180 inches per min. max. on working stroke, 120 to 360 inches per min. on return stroke (depending on machine size).

Pressure: Infinitely variable, External adjustment. Pressure gage indicates exact pressure. Max. Press. 1000 to 1500 lbs. per sq. inch depending on size.

Floor Space: Only 29 x 50 inches on largest model.

For Complete Details, ask for Bulletin PA-45.

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"SIAMESE TWIN" CLEANING RACE

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Perfect Timing for More Efficient Production!

The Alvey-Ferguson "Siamese Twin" installation shown above houses a Wire Mesh Conveyor Unit in the left section and a Rotary Drum Unit in the right section.

Small metal parts are conveyed to this A-F "Siamese Twin" Machine in metal boxes covered with cutting oil. The small parts are cleaned in the Rotary Drum Unit; the metal box in the Wire Mesh Conveyor Unit. The parts and box are thoro-cleaned as they "race" through the equipment—which is synchronized so that the *box always comes out first*, in plenty of time to carry the small parts on to their destination. The loading hopper on the Rotary Drum side can be operated from either end of the machine.

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METAL PRODUCTS CLEANING & FINISHING EQUIPMENT

proved ground rockets, self-propelled heavy artillery and electronic devices for locating enemy mortar and gun positions.

"In major ground campaigns to destroy the enemy's forces and end his resistance, one of the basic factors in the final decision is the armament and equipment of the infantry divisions and the manner in which they are employed. A nation with the belligerent tradition of Germany, concentrating its resources on a powerful army and enjoying every initial advantage from years of preparation for war, should have the upper hand in many if not all of the basic infantry weapons.

"In two of these basic items the German Army held an advantage almost to the end of the war. The first was the triple-threat 88-mm rifle which our troops first encountered in North Africa. Even at that time the U. S. Army had a similar weapon, the 90-mm rifle, with greater penetrating power but the Germans had theirs on the battlefields and in quantity, with the "bugs" worked out in previous battle experience over a period of years. The United States forces did not have the 90-mm in quantity at the time and were compelled to work out its shortcomings in opposition to proven weapon.

"As a result the 88 was a powerful German weapon, ahead of ours in quantity and technique almost to the end of the war. In the Spanish Civil War the Germans were careful to conceal the role of the 88 as an anti-tank and anti-personnel weapon, revealing it only as an anti-aircraft piece. When we first encountered it it was serving all three purposes with deadly effect. A single 88 could fire several rounds of armor-piercing shells at our tanks, then suddenly begin firing air-bursting fragmentation shells at our infantry following their tanks, and a few minutes later throw up an anti-aircraft fire at planes supporting the ground operation. The 90-mm rifle had no such flexibility. It could not be depressed low enough for effective anti-tank fire. Our technique of handling the gun had not been sufficiently developed so that interchangeable ammunition was available to the gun when it was needed, and we did not have the numbers of the weapon the Germans had.

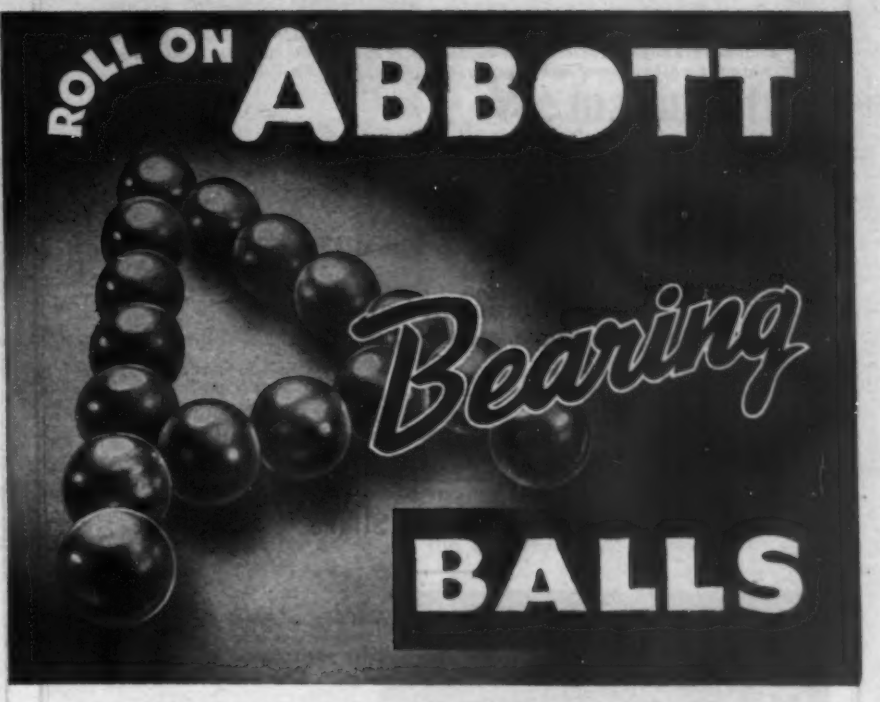
"A second marked German advantage during most of the European war was in powder. German ammunition was charged with smokeless, flashless powder which in both night and day fighting helped the enemy

tremendously in concealing his fire positions. United States riflemen, machine gunners, and gunners of all types had to expose their positions with telltale muzzle flashes or puffs of powder smoke. German preparations had given them time to develop this high-grade powder and manufacture tremendous quantities of it. They had it there and they used it. These facts should be considered along with our policy regarding the manufacture of explosives after the last war and the scientific development that should or would have followed in the plants of the great commercial manufacturers had they not been subjected to bitter attack as 'merchants of death.'

"Careful planning and husbandry of the Army's meager peacetime resources and the nature of this nation's machine economy gave the American armies in Europe two good advantages over the German enemy. One of ours was the Garand semi-automatic rifle, which the Germans were never able to duplicate. It is interesting to trace the planning and decisions that gave us the Garand rifle and the tremendous small arms fire power that went with it, noting especially that the War Department program for the Garand was strenuously opposed.

"The base of fire of a rifle platoon is its automatic weapons. The riflemen concentrate their fire on the impact area blocked out by the automatics. The base of fire of a United States rifle squad in this war has been its Browning automatic rifle. Prior to the war the Army had several hundred thousand of these weapons in war reserve. The developments of the war indicated it might be well to replace the automatic rifle with another type of small automatic weapon, but if we had, we would have jammed production facilities, replacing a type of weapon already in stock. Instead, it was decided to modify the automatic rifle and devote production to the Garand rifle.

"The Germans, on the other hand, shifted their rifle squad automatic weapon to a new type of light machine gun developed just before the war. Their standard rifle at the end of the war was still bolt-operated. They had produced a few semi-automatic rifles but they were never effective and did not reach the battlefield in numbers. In their efforts to improve the firepower of their infantry, the Germans then beat us to quantity production of the machine pistol, which we did not have in large numbers on the battlefields until well near the end of the



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War production records place Abbott Bearing Balls in the top spot for rugged, "built-in" stamina. The extremely heavy duty assemblies or the lighter, intricate mechanisms are outstanding in their respective load carrying jobs. It's their "built-in" Stamina!

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From the steel, held to Abbott specifications, thru each step in the production of Abbott Bearing Balls to the final individual ball inspection — Abbott men and methods rigidly maintain the Abbott standards of quality.

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Illinois Clay Products Company
JOLIET, ILL.

High Temperature
INSULATION

European war. Our superiority in infantry firepower, stemming from the use of the semi-automatic rifle, was never overcome.

"The greatest advantage in equipment the United States has enjoyed on the ground in the fighting so far has been in our multiple-drive motor equipment, principally the jeep and the 2½-ton truck. These are the instruments which have moved and supplied United States troops in battle while the German Army, despite the fearful reputation of its "panzer armies" early in the war still depended heavily on animal transport for its regular infantry divisions. The United States, profiting from the mass production achievements of its automotive industry, made all its forces truck-drawn and had enough trucks left over to supply the British armies with large numbers of motor vehicles and send tremendous quantities to the Red Army.

"The advantage of motor vehicle transport did not become strikingly clear until we had reached the beaches of Normandy. The truck had difficulty in the mountains of Tunisia and Italy, but once ashore in France our divisions had mobility that completely out-classed the enemy. The Germans discovered too late the error of the doctrine which a member of their general staff expressed to General Wedemeyer, then in Berlin, in the late thirties: 'The truck has no place on the battlefield.' He meant by this that an unarmored vehicle was too vulnerable to be brought within immediate fire areas.

"In the other categories of weapons and equipment of the infantry divisions, machine guns, mortars, artillery, individual equipment, the United States and the German armies were so nearly equal that neither had any marked advantage. The German infantry rocket, the Panzerfaust, had greater hitting power than the United States bazooka, which had been developed first. We believe that our use of massed heavy artillery fire was far more effective than the German techniques and clearly outclassed the Japanese. Though our heavy artillery from the 105-mm up was generally matched by the Germans, our method of employment of these weapons has been one of the decisive factors of our ground campaigns throughout the world.

"In the field of aircraft armament, United States materiel was excellent. The .50-caliber aircraft machine gun

was one of the most reliable weapons of the war. The latest version of this gun had a cyclic rate of 1,200 rounds a minute. The German 30-mm aircraft cannon had as an American counterpart a 37-mm aircraft cannon. The newest version of this United States weapon had a velocity of 3,000 foot-seconds. The Japanese primarily used a 37-mm gun built on obsolete design principles. The 75-mm aircraft cannon which some United States planes carry was a heavier gun than any other air force has ever mounted.

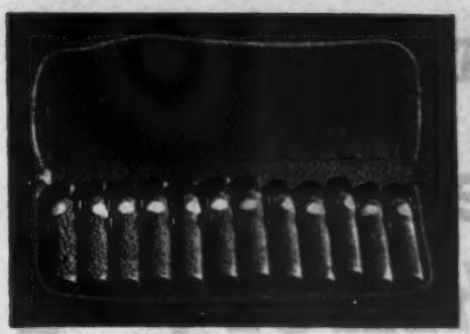
"American bombs and the newest fusing and control devices which guide them to their targets had no counterpart. United States heavy military equipment such as tractors, earth-moving machinery, railroads and rolling stock, bridging equipment, and similar items stood the test of battle splendidly.

"Radar equipment developed by the United States and Britain was superior to the electronics devices of either Germany or Japan. Our radar instruments, for example, which tracked aircraft in flight and directed the fire of anti-aircraft guns was more accurate than any possessed by the enemy. American radar detection equipment, which picked up planes in the air and ships at sea, had greater range than the German. Japanese radar was greatly inferior.

"Great emphasis was placed on airborne radar by the United States and British and the use of this device was a very important factor in the control of the submarine menace. Radar bombsights together with radio navigational aids permitted accurate bombing of German and Japanese targets under adverse weather conditions.

"The invasion of the Gilbert Islands opened a phase of warfare new to most of our troops. The enemy was concentrated within restricted areas, heavily fortified in pillboxes, and protected by mines and beach obstacles. Landing forces faced intense crossfires. The enemy could be dislodged only by shattering bombardment and powerful hand-to-hand infantry assault. Amphibious tractors proved to be one of the effective assault weapons. They could be floated beyond the range of shore batteries, deployed in normal landing boat formations and driven over the fringing reefs on to and up the beaches."

"Japanese weapons are considered by Gen. Marshall to have been inferior to the Allies'. As pointed out by General Hodge, Okinawa commander, 'the Japs have tremendous



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A shot or grit that will blast fast with a clean finish.

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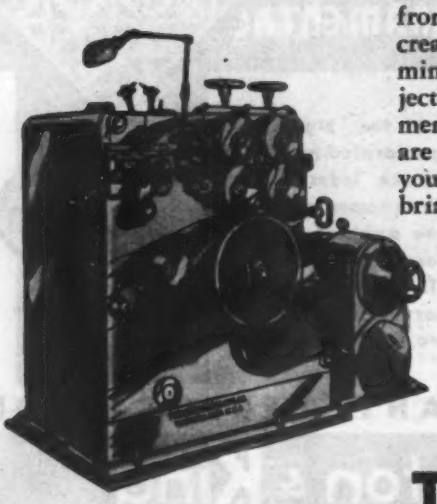
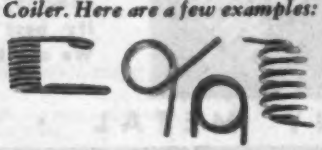


Almost any useful spring can be made on a Torrington Spring Coiler. Here are a few examples:



THE TORRINGTON
MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT

amounts of artillery and have used it far more intelligently than I have ever seen them use it to date. With best estimate, it shows around 500 or more individual weapons of 75-mm or better, including some 169-175 of caliber 105 or better. The most powerful weapon of long-range we have encountered to date is the 150 rifle with range of 27,000 yards which fires occasionally upon the two airfields from the vicinity of Shuri. They are using quite a few of the Spigot mortars (320-mm), 250-mm mortars and aerial bombs up to 250 kilograms fitted as rockets. They are also using large sized rockets somewhere in the 5-, 6- to 8-inch class.'

"In the Philippines campaign U. S. forces first met the full fury of the Kamikaze or suicide attacks, but at Okinawa the Japanese procedure was better organized and involved larger numbers of planes; also the Baka plane appeared, something quite new and deadly. This small, short range, rocket-accelerated aircraft, carried more than a ton of explosives in its war head. It was designed to be carried to the attack, slung beneath a medium bomber, then directed in a rocket-assisted dive to the target by its suicide pilot. It was in effect, a piloted version of the German V-1."

Issues Mining Handbook

Toronto

• • • Reflecting the greatest volume of prospecting activity in many years, 559 mining companies were organized and commenced operations in Canada during the past year, it is shown by the 1945 edition of the Canadian Mines Handbook, issued recently.

Because of wartime regulations, these organizations have been limited in activity to surface work and diamond drilling but with the removal of restrictions they may now broaden their programs to the extent justified by results.

The Handbook reviews the position of the operating companies in comprehensive detail, with five-year comparisons of output, earnings and other essential information. Particulars are given of the active non-producing organizations, including office addresses, transfer agents, directors, capitalization, property holdings and current activities.

The Canadian Mines Handbook is published by Northern Miner Press Ltd., 122 Richmond St. W., Toronto 1, Canada; 320 pages; price, $1.

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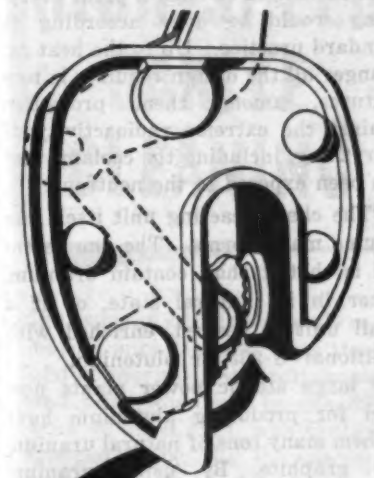

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Atomic Power Plant Seen as Possibility Within Ten Years

Chicago

• • • Within ten years it is not unlikely that power companies designing new plants for city service will consider use of atomic power for purely economic reasons, Dr. Arthur H. Compton, chairman of the National Academy of Sciences Committee on the Use of Uranium in War, told the Chicago Assn. of Commerce here recently.

Dr. A. H. Compton

He ruled out early use of atomic power for smaller heating units, such as the kitchen stove, however, declaring that there is no reason to hope that units for normal use can be built that will weigh less than perhaps 50 tons. Motor cars or airplanes of ordinary size thus will not be a fertile field for use of this type of energy.

At present, controlled atomic power in the form of heat is in continuous production in large quantities as a byproduct at several plants, especially those at Oak Ridge, Tenn., and Hanford, Wash., and is carried away in one case by air and in the other by a stream of water. The principal current objective of the process is neutrons for the transmutation of uranium into plutonium.

"Previous to the fission chain reaction, the most abundant source of neutrons was the cyclotron which operates on electric power," he said. "Per kw of energy used, the fission chain reaction gives some 10,000 times as many neutrons as a cyclotron, and it is not difficult to make a fission chain reaction plant that delivers 100 times as much power as is used by a cyclotron. This means that right now we are using large amounts of atomic power many times more efficiently for the particular process of producing neutrons than the best electrical machine that we have been able to devise."

A reasonably efficient plant using superheated steam for driving a turbine could be put into operation within a year if there were need for it, Dr. Compton declared, although a

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If you could cast to shape and lower the machining time on your die castings from ⅓ to ½—the saving in both time and cost would help immeasurably on your post-war tooling.

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Practically all manufacturers of automobiles, trucks, tractors, farm implements, refrigerators, stoves use Strenes metal dies—as do firms in many other fields. So can you—and to your advantage in cost and time.

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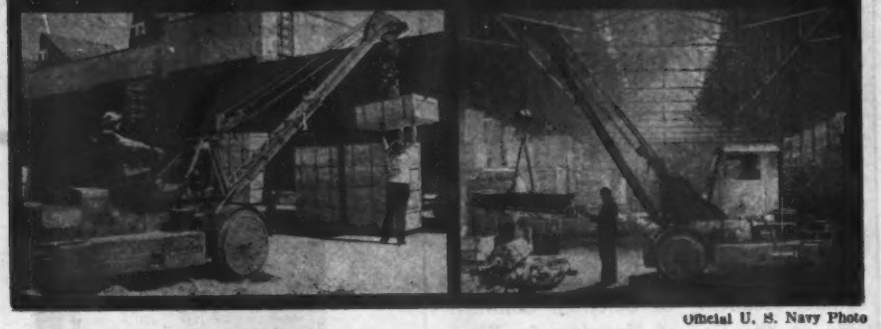

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This 20-page Bulletin gives detailed information on the Rotary Positive Displacement principle and its advantages. Characteristic curves are shown for different drives, together with sizes, dimensions, and complete specifications. Numerous installation photos show various applications for which Roots-Connersville Rotary Positive Blowers are particularly well adapted. Write for your copy of Bulletin 22-23-B-11.

ROOTS-CONNERSVILLE BLOWER CORP.
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Roots CONNERSVILLE SINCE 1854 Rotary Positive BLOWERS

number of years development would be required to make it an economical competitor with existing practice.

"While there are several other possibilities," he said, "the most obvious method of producing power from atomic fission is to heat a cooling agent such as air or steam or liquid metal in the chain reactor unit, and pass this heated coolant through a heat exchanger which heats the steam for driving a turbine. Beyond the heat exchanger of such a plant everything would be done according to standard practice. Up to the heat exchanger all the design requires is new features, among them protection against the extreme radioactivity of everything, including the coolant, that has been exposed to the neutrons.

"The chain reacting unit itself can assume many forms. The one essential is that it shall contain uranium, either in its natural state, or if a small unit is desired, enriched with additional U-235 or plutonium. . . . The large atomic power plants now used for producing plutonium have in them many tons of natural uranium and graphite. By using uranium containing more than the usual fraction of U-235, chain reacting units have been built that are of much smaller size.

"There is, however, a lower limit to the size and weight of an atomic power plant that is imposed by the massive shield needed to prevent the neutrons and other dangerous radiations from getting out. Next to cosmic rays, these radiations are the most penetrating that we know, and for a plant designed to deliver for example no more than 100 hp, are enormously more intense than the rays from a large supply of radium or an Xray tube. To stop them, a shield equivalent in weight to at least two or three feet of solid steel is needed. There are basic laws of physics that make it appear very unlikely that a lighter shield can be devised. This means that there is no reason to hope that atomic power units for normal uses can be built that will weigh less than perhaps fifty tons.

"Prominent among the advantages of atomic power are the extraordinarily low rate of fuel consumption and consequent low cost of fuel, and the wide flexibility and easy control of the rate at which power is developed, and the complete absence at the power plant of smoke or noxious fumes. With regard to fuel consumption, when completely consumed, the

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Helpful technical data covering this subject is contained in a specially prepared 16-page manual. A FREE copy will gladly be mailed on request.

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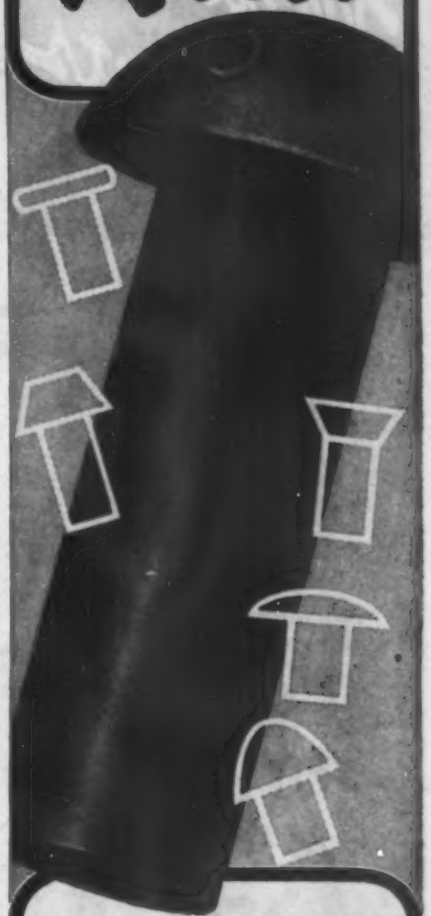
fission energy available from a pound of uranium is equivalent to over a thousand tons of coal. With the prewar price of uranium oxide at roughly $3.00 per lb and of coal at $3.00 per ton, this would mean the economical use of uranium as fuel only if one part in a thousand of its available energy is used. Actually we should expect the first plants built to deliver atomic power to be considerably more efficient than this in their use of the fission energy, which would mean a substantial cost advantage in favor of uranium. One must consider also, however, the need to purify and fabricate the uranium into the desired form. For certain types of power plants under consideration, a considerable amount of separated U-235 is required. Attempting to consider all such factors, it appears that the fuel cost of the atomic power plant of the future will be small as compared with the corresponding fuel cost of a coal burning plant.

"In considering the economic aspects there are, however, many other factors. It is not really possible for these to be explored until we have actual experience with atomic power plants. First is the capital cost. Clearly if one must charge against this cost what is spent in research and development, this capital cost is very high indeed. If, however, one looks down the line to a billion dollar a year national industry based on atomic power, the nation can afford a considerable investment in the research and development required to bring this industry into being. When this development is done, it appears not unlikely that the cost of building and maintaining a large scale atomic power plant may compare favorably with that of a coal consuming plant of the same capacity.

"Much remains to be learned, however, regarding the metallurgical and other technical problems involved in constructing a successful plant to transform fission energy efficiently into high temperature heat. The materials to be used may be expensive. The designs are, however, essentially simple. An inherent advantage of the atomic power unit is that the heat sources—i. e., the uranium blocks—can readily be maintained at any desired temperature regardless of how rapidly the heat will be needed, and that corrosion due to excessive heating is controllable.

"One notable limitation to the use of atomic power is the need for careful protection against harmful rays. Explosions must be planned for. The dangers of explosions of the 'boiler'

Oliver Rivets



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type plant with an atomic power plant are about the same as with a steam plant, which is to say they are practically negligible if the plants are designed and handled by competent engineers. There is, however, real possibility of damage to the operating personnel from ionizating rays emitted by the plant itself and by all materials that are taken out of the plant. That the problem can be solved is shown by the fact that in all of the operations of the half dozen or more such plants, some of which have now been working for years, not a single serious exposure has occurred," Dr. Compton said.

He laid this record to vigilant instruction and supervision and declared that atomic power plants can be safely operated and serviced only with the help of health supervisors who are familiar with radiological hazards.

From the sociological aspect, the noted physicist declared that development of the atomic bomb made world government inevitable.

"The choice we have is whether this government will be one agreed upon by the peoples of the world, or whether the great nations will elect to fight a catastrophic third war that will settle who is master."

In a future war, no city of over 100,000 population would remain as an effective operating center after the first hour of the war, he predicted.

"At least 10 pct of the attacked nation's population would be wiped out in the initial blow."

Though the attacker's citizens may have moved immediately underground, his great cities as well as his surface production plants will be annihilated when the counterattack is launched, he stated.

"If the United States should be a party to such a war, we should expect St. Louis and Chicago to follow Hiroshima and Nagasaki into oblivion. And with the destruction of our cities we should expect about one out of every four of us to be killed," Dr. Compton added.

With rapid developments in weapons, including the atomic bomb, he declared that the problem of how to protect against damage by the enemy is correspondingly farther from solution than ever. It has been demonstrated that whatever bombs are required can be produced and delivered to their targets, it was indicated.

Any great nation that approaches the problem with determination can make atomic bombs within a decade, Dr. Compton asserted.

Winged Victory of Samothrace representing a winged Nike, who sweeps down with lightning speed; seeming to force a way for the imposing Goddess of Victory.

Bearing Balls

made in this modern plant perform perfectly at lightning speed or at the speed of a snail's pace.

In this ball plant, where balls only (not bearings) are made, more and more manufacturers are discovering the uniform results, in the finished product, of the exactness practiced here.

In this plant the equipment, machinery and instruments are of the latest design. The personnel is above the average and well-trained. These facts visitors are quick to discern.

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For precision balls that reduce friction, wear and maintenance costs to a minimum, specify Universal Precision Balls.

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Canadian Purchasing Regulations Lifted By Cancellation of CMP

Ottawa

• • • Following the cancellation on Sept. 30, of the United States Controlled Materials Plan, Canadian manufacturers and distributors no longer are restricted in purchase of steel, copper, aluminum and other products from the United States, Munitions Minister Howe announced. This means that such manufacturers and distributors will be relieved of the burden of priorities paper work with which they have had to contend since the early part of 1941.

Mr. Howe stated that, "By the end of September practically all Depts. of Munitions and Supply Orders, controlling purchases from the United States had been removed; however, a Regulation (Priorities Officer's Order P.O. 10) and other procedures to provide assistance on the purchase of steel and other items required for continuing war production and for emergency civilian purposes remain."

On Sept. 30, the following Orders were revoked:

1. The Steel Control Order by which persons placing purchase orders in the United States obtained prior approval from the Controller.

2. The Metals Control Order which provided for prior approval from the Controller for the purchase of copper from the United States and restricting to some extent the purchase of copper and copper wire rods from producers.

3. The Metals Control Order which provided for prior approval from the Controller on purchase from the United States of aluminum and aluminum alloys and also calling for monthly inventory reports.

4. Priority Order B4, which required practically all purchases made in Canada to be identified by program classification symbols.

5. Priority Order 5C, which prescribed procedure for the automatic use of preference ratings on purchases from the United States of various maintenance, repair and operating supplies and minor items of capital equipment.

6. Priority Order 6A, which restricted to use of supplies imported for maintenance and repair.

7. Priority Order 9, which set forth certain priorities procedures regarding purchases for military use from the United States.

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● WRITE today for complete information on the CONCO line of hand-powered and electric cranes, hoists and trolleys — a complete line, tried and proven for over twenty years. CONCO engineers are qualified to recommend the right type of handling equipment for faster, more economical production in your shop. Write us now, and take advantage of our long experience in moving more materials, faster and at less cost.

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No other saw can do as much!

No Other Saw Can Do As Much! MARVEL Universal Band Saw, 18" x 18" capacity, will cut-off, slot, trim, notch, rough-out, or split bar stock, pipe, structural sections, mouldings, tubing, large standard blocks, or small regular shapes with speed, ease, and convenience. Few shops working with metal can afford to be without this most versatile of all saws.

MARVEL SAWS

Complete Range of Metal Sawing Machines
Being the largest exclusive manufacturer of metal sawing machines and blades, both hack saw and band saw type, we have the correct answer to your cut-off problems. Each MARVEL model has a distinct application, so write us and we will send our catalog, price and recommendation for the saw to fill your requirements most efficiently. MARVEL sawing engineers are also available to discuss and analyze your cut-off work. (Without obligation of course)

More cutting is simple and accurate with the MARVEL Series 8 Band Saw. No change in position of work. Simply set the saw column at any required angle up to 45° either right or left of vertical. Do not confuse with any other "band saw like the No. 8 machine. There is no other MARVEL.

ARMSTRONG-BLUM MFG. CO.
5700 Bloomingdale Ave., Chicago 39, Illinois, U.S.A.

How to Protect Motor And Machine Components

(CONTINUED FROM PAGE 68)

with accompanying low hydrogen embrittlement. Springs made from material of less than 1/16 in. size should not be electroplated at all if any other satisfactory protection can be used.

Identification plates should have their instructions deeply etched into the metal where possible and a quite thick coat of clear varnish applied for protection.

It cannot be overstressed that in any design in which it is desired to incorporate corrosion proofing, the definite specifications must be a part. It is not enough to say "cadmium plate" and hope that the problems are solved. Cadmium plate might mean anything from a flash 0.0001-in. thick to a 0.0005-in. layer, depending upon the individual who actually does the plating. In addition, cadmium plate might be applied on a dirty surface and pores created that would definitely result in corrosion. "Paint using a zinc chromate primer" on a print may have a fairly definite meaning to the designer but to the purchasing agent it may mean that as long as a coating has been applied with some zinc chromate in it no matter how small the amount or how thin the film, the requirements have been met. Here again a definite description of what is meant by zinc chromate primer plus definite film thickness requirements should be shown. This accuracy of description also applies to all organic coatings both prime and final.

Acid Electric Furnace Carbon Control

(CONTINUED FROM PAGE 71)

[4] K. L. Clark and N. Kowall, "Hardness Measurement as a Rapid Means for Determining Carbon Content of Carbon and Low-Alloy Steels," Trans. A.I.M.E., v. 158, 1944, pp. 328.
[5] Burns, Moore and Archer, "Quantitative Hardenability," Trans. ASM, v. 26, 1938, pp. 1.
[6] Rogers, Wentzel and Riott, "Magnetic Methods for Determining Carbon in Steel," Trans. ASM, v. 29 (1941), pp. 969.
[7] G. Soler, "New Carbometer Controls Speeds Production and Improves Quality," *Metal Progress*, v. 31, 1937, pp. 159.
[8] H. H. Blosjo, "A Rapid Method for Determining Carbon in Plain-Carbon Steels for Control Purposes," Trans AFA, v. 47, 1939, pp. 469.
[9] H. K. Work and H. T. Clark, "A New Instrument for the Magnetic Determination of Carbon in a Steel Bath," Trans. AIME, v. 140, 1940, pp. 475.
[10] C. Locke, "Introduction to Magnetic Methods for the Determination of Carbon Content of a Steel Bath, Electric Furnace Steel Process," AIME, v. 2, 1944, pp. 169.
[11] C. H. Herty, Jr., "Slag Control," Trans. AIME, v. 140, 1940, pp. 13.
[12] J. Juppenlatz, "Acid Electric Furnace Slag Control," Trans. AFA, v. 50, 1942, pp. 322.
[13] C. W. Briggs, "Slag Control," *Steel Foundry Facts*, February, March, April, 1942.

Mechanized Coating Of Ingot Molds

(CONTINUED FROM PAGE 53)

a time, for 5 sec each. A single push-button operates the motor for a single blowing cycle, a time switch breaking the circuit after the cams, which are driven through a set of gears, have made one complete revolution. Individual operation of any of the three blasts can be secured by depressing the valves by hand as desired. This control setup is shown in fig. 2.

As soon as the third mold has been coated, the crane picks up the set of three molds and returns them to their positions on the ingot buggy, the stools having been blown clean while the molds are being sprayed.

Air is blown into the bottom of the hopper to agitate the powdered pitch, which otherwise tends to pack, and at the same time assures a constant supply of powder to the suction line leading to the mold being coated. A screen just above the suction intake serves to remove any dirt or lumps that might clog the spray system.

Iron Freight Car Wheel Prices Up

Washington

• • • Upward revision in manufacturers' ceiling prices for two sizes of wrought steel freight car wheels that are standard for use by American railroads was announced by OPA on Oct. 11. The higher prices become effective Oct. 16 and reflect increased direct labor rates and material costs experienced by manufacturers since October, 1941, OPA said. The increases are approximately 18 pct.

The new ceilings, f.o.b. Chicago or Pittsburgh, are as follows:

Type Class 33-C—Maximum price (before treatment) $21.80 each.

Type Class 33-D—Maximum price (before treatment) $23.60 each.

To these prices manufacturers may make the additional charge for extras they had in effect Oct. 1, 1941.

SMOOTH ACTION FOR AIR OPERATED UNITS . . .

Correct working pressure means smoother, better operation of pneumatic equipment, and often the correct pressure is considerably less than full line pressure. Hannifin Pressure Regulating Valves provide the accurate sensitive reduction of air pressures that helps operators get the most from pneumatic machinery. Hannifin piston-type design provides instant adjustment over the entire pressure range from 150 lbs. down. Long valve stem travel in this design gives large volumetric capacity to meet fluctuating demand with minimum restriction to flow. Write for Regulator Bulletin 56 with full description. Hannifin Manufacturing Company, 625-631 So. Kolmar Avenue, Chicago 24, Illinois.

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